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NEWSPAPER

Take a Break . . .

NEW YORK – Data processors here this week for the National Computer Conference (NCC) can find computer exhibits elsewhere than in the New York Coliseum. In fact, an exhibit tracing the history of IBM DP equipment can be viewed by those rounding the corner of Madison Ave. and 57th St.

The nine-part display in the IBM exhibit center's street-level showcase windows illustrates how data processing has declined in cost, become more efficient and easier to apply through advances in technology.

Over 160 items, including actual computer elements, are on display.

Replicas of the first punched card equipment invented by Herman Hollerith and used in the 1890 census are on view, as is a tabulator developed 40 years later using relays which could add numbers at the rate of 150 a minute.

Univac Announces 90/80 As NCC Gets Under Way

By Ronald A. Frank
Of the CW Staff

NEW YORK – Univac will introduce the large-scale virtual 90/80 system designed to provide an upgrade for existing Univac and IBM 370/145 sites at the National Computer Conference here this week.

The 90/80 is the first Univac mainframe to use emitter-coupled logic (ECL) circuitry, the company noted.

The CPU has two specialized processors in what Univac described as distributed function architecture. An instruction processor executes command, control and arithmetic instructions; a peripheral processor executes instructions for the input and output of data.

Each processor operates without interference from the other, Univac said.

The 90/80 is fully upward-compatible with the 90/60 and 90/70 medium-scale systems and the Series 70, which includes former RCA systems, according to Univac. These earlier systems use the VS/9 virtual operating system which runs on the 90/80 and is said to provide a multi-environment system for batch, remote batch and transaction processing.

The 90/80's semiconductor main memory starts at 542K bytes and can be expanded to 4.1M bytes in increments of 524K. Memory cycle time is 450 nsec for eight bytes while the instruction processor has a cycle time of 98 nsec, the vendor said.

The 90/80 is aimed at upgrading the IBM DOS/VS user of the 370/135 and 145. Depending on configuration, this user can save up to 25% over a 370/158 system with comparable processing power, a Univac spokesman estimated.

Present users of the IBM 360/65 and 370/155 operating in an MFT/MVT environment could also save money by upgrading to the 90/80, he said. As an upgrade for current Univac Series 90 users, the 90/80 is said to have 2.5 times the CPU power of the 90/70.

Although the 90/80 is oriented to virtual operation under the VS/9 operating system, it will also run with the earlier OS4 software in nonvirtual mode, the spokesman said.

Communicating Method

To emphasize the communications capabilities of the 90/80, Univac introduced the Virtual Integrated Communications Access Method (Vicam) for inquiry/response, queued message processing, multiple destination routing and transaction-oriented processing.

This access method, which operates under VS/9, is an upgrade for the earlier Icam software, Univac said, adding the 90/80 can support up to 256 communications lines via multichannel communications controllers.

The recently introduced UTS 400 and 700 terminals [CW, May 10] can operate on the 90/80, as can the earlier Uniscope and DCT series terminals. Most mainframe peripherals from Univac can run on the 90/80 including the recently unveiled

(Continued on Page 5)

Calls IBM Arguments 'Frivolous'

Judge Allows U.S. to Use FBI in Trial

By Nancy French
Of the CW Staff

NEW YORK – A federal judge has rejected as "frivolous" and "not persuasive" IBM's arguments against the government's use of agents of the Federal Bureau of Investigation (FBI) to interview IBM trial witnesses in the antitrust suit against it here.

In an opinion handed down by Judge David N. Edelstein during the current trial recess, ground rules were set down that apply to witness interviews conducted by both parties, bringing to an end a dispute that began about a month ago [CW, May 17].

The government plans to use the FBI to interview 131 of IBM's 400 trial witnesses.

In its motion to the court, IBM counsel argued that FBI interviews are inherently coercive and abusive; FBI interview reports are unfair, secret weapons in the hands of government counsel; and use of the FBI fundamentally impairs IBM's ability to defend itself.

Furthermore, use of the FBI violates the Publicity in Taking of Evidence Act since the interviews are "virtually depositions" and not interviews, IBM said.

"Whatever the validity of IBM's arguments" about the FBI's abuse of power in other circumstances, "such an assertion cannot support the proposition [the FBI] is inherently coercive," Edelstein said.

He rejected IBM's claim that witnesses feared the FBI would retain a record of a witness' refusal to cooperate. "The FBI does not retain such information in its files," Edelstein said. IBM's claims of apprehension on the part of witnesses is "insufficient support for the claim that no true consent by the witness is obtainable," he said.

'Good-Faith Error'

The incident described by IBM in which an agent was alleged to have incorrectly told a witness IBM knew or approved of the FBI interviewing practice was "a good-faith error," Edelstein said.

"Government counsel have taken steps to ensure that such an incident is not repeated," Edelstein said.

In its motion, IBM claimed FBI interviews abridged its right to a fair trial because it could result in witnesses asking to be withdrawn from the case.

Edelstein said he would hear IBM's complaints of FBI conduct only to the extent that it violates IBM's rights. However, IBM "has no standing" to assert alleged

(Continued on Page 4)

OS/VS2 Release 3.7 Enhances Scheduler, Supervisors, JES2

By Don Leavitt
Of the CW Staff

WHITE PLAINS, N.Y. – Release 3.7 of OS/VS2, announced late last month by IBM, provides the large-scale 370 user new capabilities in Job Entry System 2 (JES2), enhancements to Scheduler and Supervisor and a new data management element, according to the vendor.

Concurrent with the introduction of the operating system release, IBM also announced a change in its packaging and method of distributing the system software. With the change, various features,

(Continued on Page 8)

Groups Join Forces to Counter Bell Efforts to Pass Reform Act

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – Companies and organizations threatened by the Consumer Communications Reform Act have begun a campaign to block the passage of the AT&T-sponsored legislation.

Both equipment suppliers and specialized carriers have begun to speak out in an effort to blunt the efforts that have been mounted by the Bell System and other members of the telephone industry [CW, May 24].

Five specialized carriers have formed the Ad Hoc Committee for Competitive Telecommunications (ACCT). "We are convinced the legislation is both anti-consumer and antireform. If enacted, the act would eliminate even the limited freedom of choice now enjoyed by increasing numbers of communications users," the carriers said.

The telephone industry has launched a "carefully orchestrated lobbying and public relations campaign. . .to create a false sense of urgency" to force hasty Congressional action in an election year, ACCT said.

At the same time, the Independent Data Communications Manufacturers Association (IDCMA) issued a statement which said, "AT&T has been using the funds of the very residential and rural users it claims to defend in a campaign organized to increase its monopoly hold upon a wide range of equipment and services."

The computer industry could be especially hard hit by the passage of the proposed legislation because terminal equipment including computers and "a wide range of peripherals" could be brought under the control of state regula-

(Continued on Page 4)

This is the third in a series of articles describing the efforts being expended behind the scenes to inform Washington legislators and others about the pros and cons of the Consumer Communications Reform Act of 1976, now pending in both houses of Congress.

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Appeals Court Hears IBM vs. Catamore

By Molly Upton
Of the CW Staff

BOSTON — Round two of the IBM vs. Catamore Enterprises, Inc. case took place here last week when attorneys for both sides presented arguments before the three-judge panel of the U.S. Court of Appeals for the First Circuit.

The presentations essentially outlined the contents of the respective sides' briefs [CW, April 26], interspersed by questions from the panel on the conduct of the trial, the demand for the jewelry manufacturer's products and the need for a written 1969 systems engineering services (SES) agreement.

Calling the case essentially a contract claim, Jack E. Brown of Brown & Bain argued for IBM that the admission by Judge Raymond J. Pettine of the oral agreements between IBM and Catamore was improper.

Submission of such points to the jury represented a violation of contract law, he said, because the agreements touched on the same subject matter.

Furthermore, he argued, the language of the SES agreement stated succinctly in bold face type: "The customer acknowledges that he has read this Agreement, understands it and agrees to be bound by its terms and further agrees that it is the complete and exclusive statement of the agreement between the parties, which supersedes all proposals oral or written and all other communications between the parties relating to the subject matter of this Agreement."

"Catamore's refusal to read can't be made into a rule of law," Brown said.

Fraud Charge an 'Afterthought'

Furthermore, Brown said, the year specified in the contract within which Catamore could rightfully bring charges against IBM for damages arising from the contract had expired.

For this reason, Catamore added the charge of fraud, he said. "The allegation of fraud [was] an afterthought . . . If this is the way to get around a written contract, then where is the sanctity?" of contract law, he asked.

Also, Catamore should not have been allowed to avoid the limitations of the SES agreement by amending its complaint to include the charge of negligence, Brown argued. He cited Pettine's charge to the jury as being remiss on this point.

Catamore attorney Thomas K. Christo argued IBM had not previously objected on this point, so the argument was therefore inappropriate at the appeals hearing.

Catamore's attorneys argued the written agreement covered only 10% of the work which IBM had previously orally agreed to supply. Therefore, IBM's failure to deliver a production control system was not governed by the limitations of the written contract.

Albert P. Zabin, a colleague of Christo, said the SES agreement by itself was not a contract.

Since IBM never performed any part of the oral agreement, it became impossible to deliver the final 10%, he said, contending IBM cannot claim the argument is only over the remaining 10% that wasn't delivered.

Catamore Brief Claims Jury Had 'Ample Evidence' to Find Fraud

By a CW Staff Writer

BOSTON — The jury that awarded $11.4 million to Catamore Enterprises, Inc. in the IBM vs. Catamore case was presented with "ample evidence" to conclude "that IBM obtained the December 1969 systems engineering services [SES] agreement by fraud," according to a brief Catamore filed with the appeals court that heard the case here last week.

As a result, the clauses limiting IBM's liability on two contracts with Catamore and its subsidiary and void, the Providence R.I. jewelry manufacturer said.

The brief, which followed the opening round of the appeals process instituted by IBM, rebutted several of the charges made by IBM in its attempt to seek a new trial or have the verdict overturned [CW, April 26].

In addition to upholding the verdict and calling the case "untainted by error," the Catamore brief declared the oral agreements for services made in 1968 between Catamore and IBM were admissable as evidence.

IBM, both in court and later in its appeal, stated such admission was improper.

Catamore's brief claimed some of the arguments in the IBM appeals brief were improper and could not be considered since these issues had not been raised during the trial.

The damage award of $11.4 million was the result of "careful and adequate documentation and expert testimony based on a fully adequate data base and unobjectionable and essentially unobjected-to instructions from the court," Catamore said.

The Catamore suit, initiated after IBM sued to collect the $68,453 it said Catamore owed, charged IBM with misrepresentation, fraud, negligence and breach of contract.

Catamore claimed damages totaling $26.2 million because, it said, it had never obtained a working production control system or merchandise control system.

Commenting on remarks made about the damage award in the IBM brief's preface, the Catamore filing said IBM, "under the guise of arguing questions of law, essentially argues about the weight of the evidence."

Turning to the issue of damages, Catamore stated "it is not often that one finds a blatant appeal to emotions in an appellate brief, but that is what is found [in a section] IBM's brief.

"The comparisons that it makes are designed obviously to try to stir the emotions of the court. Most of the statements about the case in this section are either inaccurate or totally unsubstantiated by any evidence and, indeed, there is but one reference to the testimony.

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Ad Hoc Committee Formed

Groups Join Forces to Counter Bell Lobbying Efforts

(Continued from Page 1)

tory agencies, IDCMA said.

"The public will ultimately bear the burden of the extension of monopoly power expounded by this legislation," the vendor organization warned.

Working to Limit AT&T Control

In addition to opposing the AT&T-sponsored legislation, some groups are countering the telephone industry in other ways. The Computer Industry Association (CIA) has been working for some months with the Senate Antitrust and Monopoly Subcommittee to draft legislation that would limit the monopoly control of the telephone company.

The proposed legislation has not yet been introduced in Congress, but it would place the telephone companies under the Public Utility Holding Company Act of 1934. This would prohibit horizontal and vertical integration and in effect require AT&T to divest itself of Western Electric, allowing the manufacturing affiliate to compete like any other company, a CIA spokesman said.

Under this proposal the Bell operating companies would no longer be part of the Bell System, and they would be allowed to purchase equipment on a competitive basis instead of only from Bell suppliers.

The CIA is expected to release additional information on its legislative work soon, but a spokesman emphasized that the work with the Senate subcommittee had begun some time before the first version of the Consumer Communications Reform Act was introduced.

Another organization concerned about the impact of the proposed Congressional legislation is the Computer Business Equipment Manufacturers Association (Cbema). A spokesman said the industry group certainly does not favor the bills now pending because of the restrictions that would be placed on Cbema members. The group will make its position known in the near future in more detail, he said.

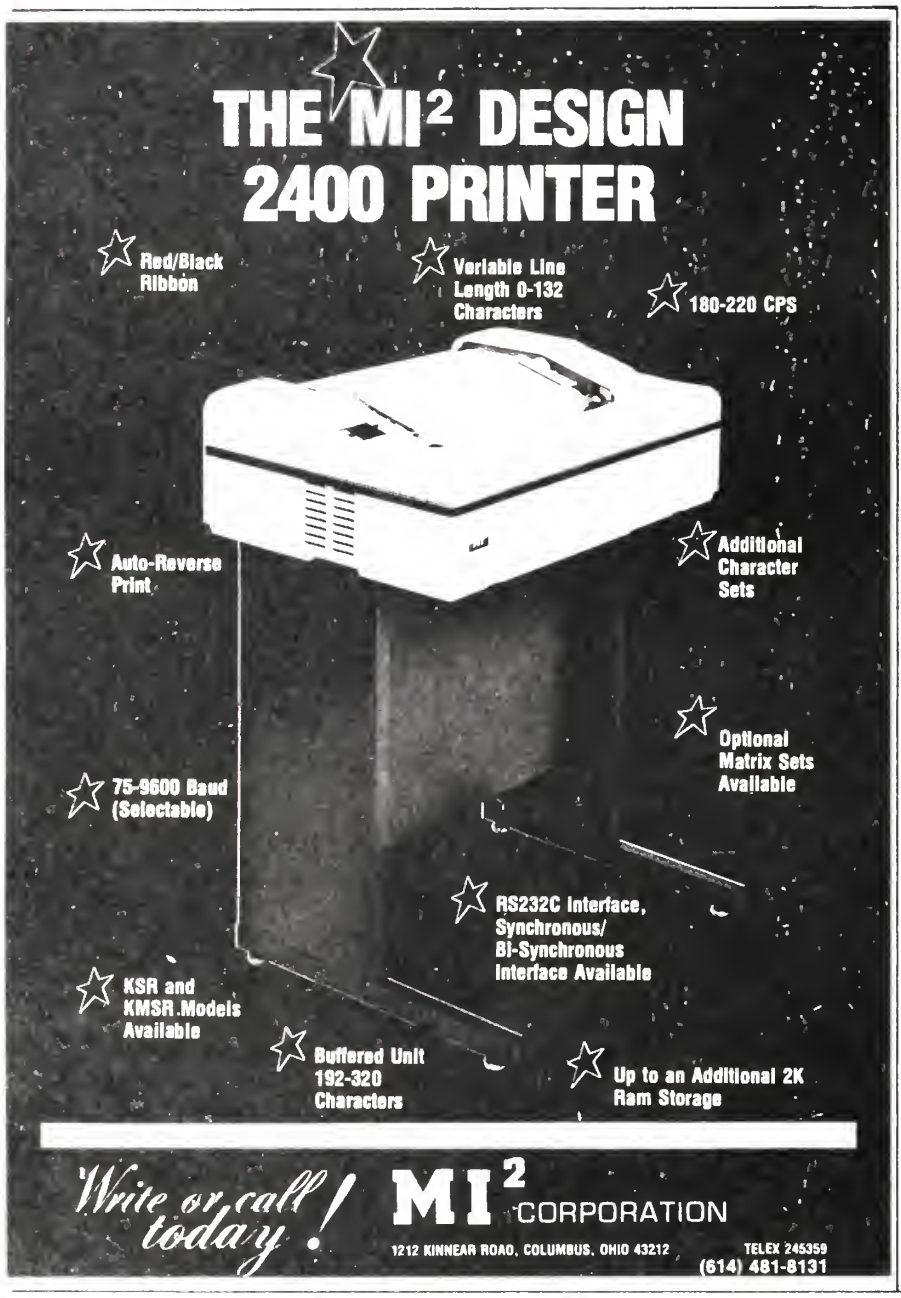
Related Move

In a related move, Sam Wyly, president of Data Transmission Co. (Datran), wrote to the Federal Communications Commission (FCC) proposing that the commission require AT&T and its operating companies "to account fully for all activities involved" with efforts related to the Consumer Communications Reform Act. These reports should clearly describe each activity, the number of officers and/or employees involved in the activity, wage and other expenses and the costs of the legislative efforts, Wyly said.

"There is a legitimate substantial regulatory question as to whether the captive ratepayers of the telephone monopoly should be the ones to underwrite the multimillion-dollar costs of the political action program." These are costs which have no relationship to the rendition of communications services for which the public must pay, Wyly said.

"Because of the pervasiveness of the telephone monopolies, program of propaganda and indoctrination, it is practically impossible to identify or quantify all of the many facets of that program. But it is common knowledge that for well over a year AT&T has sought to involve its 3 million shareholders by. . .a systematic program of management visitations to each of them. Its efforts have included the regimentation of its 1 million employees and their labor unions," the Datran chief said.

Wyly also charged AT&T has been making "unstinted use" of the printed and broadcasting media to get its message across to the general public. And Bell has given "concerted and continuous attention to almost all members of the Congress as well as state and local legislators on virtually a one-to-one basis of personal contact," he charged.



Judge Rejects IBM Arguments Against U.S. Use of FBI Agents

(Continued from Page 1)

violations of the rights of its witnesses, he said.

Perjury Sanctions

IBM had argued that introduction of the FBI into the case subjects IBM witnesses to the threat of perjury sanctions for false statements made to FBI investigators, Edelstein noted.

However, false statements made to any agent of the Department of Justice, including Antitrust Division attorneys, would be subject to the same penalties, he said.

Since the interviews in question are voluntary, are not conducted under oath, and no verbatim transcription is made by the interviewer, it is questionable whether the reports of these interviews would form the basis of a conviction under U.S. code, Edelstein's opinion said.

Speculation Offered

IBM offers nothing more than speculation and unreasonable inferences and does not persuade the court to enjoin further use of the FBI and possibly impair dramatically the government's attempt to implement its right to interview the defendant's witnesses, Edelstein said.

Edelstein ordered both parties to inform their witnesses of the following:

- They have been designated as trial witnesses (for whichever side has called them), and they are not under the control of the party designating them as witnesses.
- If they are willing, they will be interviewed by attorneys for IBM, attorneys for the government or the duly authorized representative of either side, including FBI agents, economists, technical representatives or paralegals working under the direction and guidance of lawyers representing parties to this litigation.
- Interviews with either side are "entirely voluntary," and witnesses are free to impose whatever conditions they chose upon such an interview. Any questions concerning granting or refusing to grant an interview may be directed to the witnesses' attorneys or to the attorneys for either party.
- In the event that the conduct of any person either in arranging or conducting an interview is coercive or intimidating, a witness may immediately terminate contact with that person and report the occurrence of such an event to the witness' own counsel or the counsel for the party that designated him as a witness.
- Whenever counsel for the adverse party or one of its agents contacts a trial witness of the opposing party, such counsel or agent shall identify his relationship with the party on whose behalf the interview is sought.

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WANG

IBM to Appeal Order to Relinquish Documents to U.S.

NEW YORK – IBM has informed the judge hearing the U.S. government's antitrust case against the corporation that it will appeal his order requiring it to turn over documents it considers privileged to the Justice Department.

Judge David N. Edelstein issued an order on May 14 instructing IBM to begin giving some 21,800 documents to the government within 15 days. The documents are those whose claims of privilege were reviewed by "special masters," judges assigned by Edelstein to determine if the papers really should be kept confidential.

The special masters have been working on these questions of privilege on the basis of attorney-client privilege since the spring of 1973, and they have completed their review and filed their reports with Edelstein.

Presented with about 26,362 documents in the fall of 1974, the masters found 2,173 to be privileged.

Appealed 90% of Rulings

IBM appealed the rulings of the special masters on about 90% or about 21,800 documents of those not held privileged and therefore confidential.

In his may 14 opinion, Edelstein said "the appeal of many of these 21,800 documents is meritless. It is an attempt to relitigate issues already decided by this court."

Specifying particular categories of documents, the judge ordered IBM to produce these papers to the Justice Department, and it is this order that IBM is appealing.

This move represents yet another mandamus action against the district court judge. IBM last asked for and received a reversal of Edelstein's orders in October [CW, Nov. 12].

SSA Ordered to Give SSNs to Locator Service

WASHINGTON, D.C. – The battle over whether the Social Security Administration (SSA) should provide Social Security numbers (SSN) to help the Parent Locator Service find deserting parents whose families receive welfare has been resolved in favor of the Parent Locator Service.

The Department of Health, Education and Welfare (HEW) recently published a regulation requiring the SSA to provide the SSNs to the Social and Rehabilitation Service (SRS) as a "routine use" allowed under the Privacy Act of 1974.

The SRS is the HEW unit which provides welfare money and services to the states.

The dispute revolved around which law took precedence – the Privacy Act, which made disclosure of personal information illegal except for predefined "routine uses," or the 1974 amendments to the Social Security Act, which set up the Parent Locator Service and required the SRS to use Federal government resources to locate deserting parents.

Those resources included a time-shared network and the master files of the SSA and the Internal Revenue Service [CW, April 23, 1975].

The SSA amendments did not specifically require the SSA to turn over SSNs, but did call for the HEW Secretary to use "all information at his disposal" to assist in the program, according to HEW spokesman Ed Gleiman.

Univac to Announce 90/80 System at NCC

(Continued from Page 1)

6,250 bit/in. tape drives [CW, May 24].

The 90/80 utilizes Codasyl versions of Cobol and Fortran as well as the data management system DMS/90. Under the VS/9 Personal Data Processing feature and the Unique inquiry language used in the Information Management System (IMS/90), the 90/80 is oriented "toward a personal computing facility," Univac said.

Applications packages are available for manufacturing, civil engineering, distribution and other industries.

Purchase prices for the 90/80 range from $2 million to $4 million dollars while monthly rental on one-year leases range from $43,000 to $96,000. A typical 1M-byte 90/80 with the usual peripherals and software costs about $43,000/mo.

Lease plans up to five years are available. First deliveries are scheduled for the fourth quarter, according to the firm, which can be reached through P.O. Box 500, Blue Bell, Pa. 19422.

Correction

Memorex Corp.'s Model 3640 disk drive can be attached to IBM 370/115s and up [CW, May 24].

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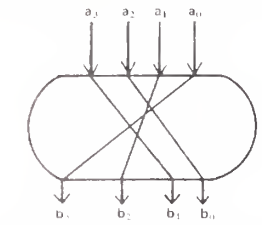
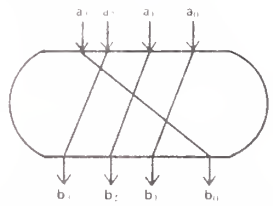
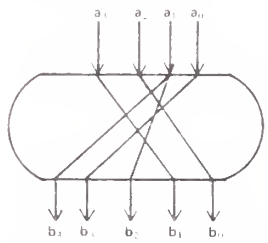


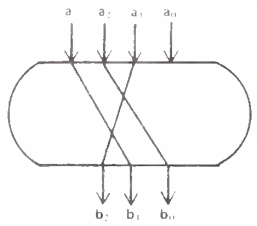
(a) BALANCED – SAME NUMBER OF BITS IN INPUT AND OUTPUT. THIS PERMUTATION IS INVERTIBLE, BECAUSE EACH INPUT BIT IS TIED TO ONE OUTPUT BIT.



(b) CYCLIC – CYCLE LEFT 1 BIT IS ILLUSTRATED

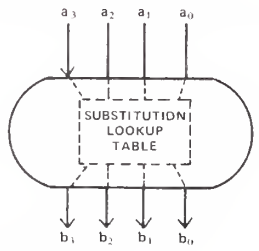


(c) EXPANDED – OUTPUT HAS MORE BITS THAN INPUT

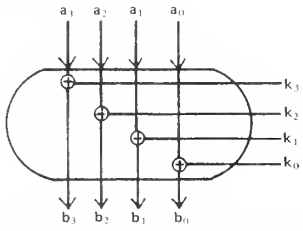


(d) CONTRACTED – OUTPUT HAS FEWER BITS THAN INPUT

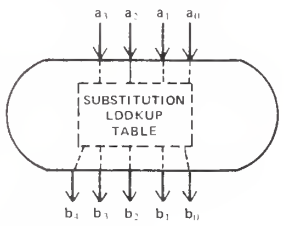
FIGURE 1
PERMUTATIONS WITH 4-BIT INPUTS



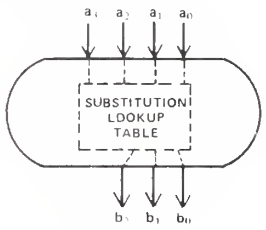
(a) BALANCED



(b) EXCLUSIVE OR (MODULO 2 BIT-BY-BIT ADDITION)



(c) EXPANDED



(d) CONTRACTED

FIGURE 2
SUBSTITUTIONS WITH 4-BIT INPUTS

NBS Standard Puts Encryption In DP Systems

By Mal Stiefel
Special to Computerworld

The National Bureau of Standards (NBS) published a proposed standard in the *Federal Register* of Aug. 1, 1975 specifying "a mathematical algorithm for encrypting (enciphering) and decrypting (deciphering) binary-coded information" for federal use.

The process is intended to be implemented "in a special-purpose electronic device. . .designed in such a way that it may be embedded in a computer system or network and provide cryptographic protection to binary-coded data.

"The method of implementation, the control of the cryptographic device and the interface of the device to its associated equipment will depend on the application and environment. . . Certification of compliance with this standard is the responsibility of the designer and manufacturer of the device."

Basic Principles

Figures 1 and 2 illustrate the various data manipulation functions found in the algorithm. The permutations in Figure 1 involve rearrangements of bits without changing their value, while the substitutions (also called ciphers) do not generally pre-

(Continued on Page 7)

a_2 a_1 a_0	0	1	2	3	4	5	6	7
b_2 b_1 b_0	6	5	1	4	7	0	3	2

(a) BALANCED, INVERTIBLE

a_2 a_1 a_0	0	1	2	3	4	5	6	7
b_2 b_1 b_0	5	2	7	6	3	1	0	4

(b) INVERSE OF (a) ABOVE

a_2 a_1 a_0	0	1	2	3	4	5	6	7
b_2 b_1 b_0	6	5	1	4	7	6	3	5

(c) BALANCED, NOT INVERTIBLE

a_2 a_1 a_0	0	1	2	3	4	5	6	7
b_2 b_1 b_0	5	4	7	6	1	0	3	2

(d) EXCLUSIVE OR, USING A KEY VALUE OF k_2 k_1 k_0 = $(101)_2$ = $(5)_8$ (NOTE SYMMETRY OF INPUT-OUTPUT PAIRS. THE INVERSE OF THIS TRUTH TABLE IS EQUAL TO THE ORIGINAL.)

a_2 a_1 a_0	0	1	2	3	4	5	6	7
b_3 b_2 b_1 b_0	C	5	2	4	E	6	A	0

(e) EXPANDED (4-BIT OUTPUT VALUES SHOWN IN HEXIDECIMAL NOTATION)

a_2 a_1 a_0	0	1	2	3	4	5	6	7
b_1 b_0	3	1	1	0	3	2	3	1

(f) CONTRACTED (2-BIT OUTPUT)

FIGURE 3
TYPICAL TRUTH TABLES FOR THE CLASSES OF SUBSTITUTIONS ILLUSTRATED IN FIGURE 2, WITH 3-BIT INPUTS. INPUT AND OUTPUT VALUES ARE GIVEN OCTAL NOTATION UNLESS OTHERWISE NOTED.

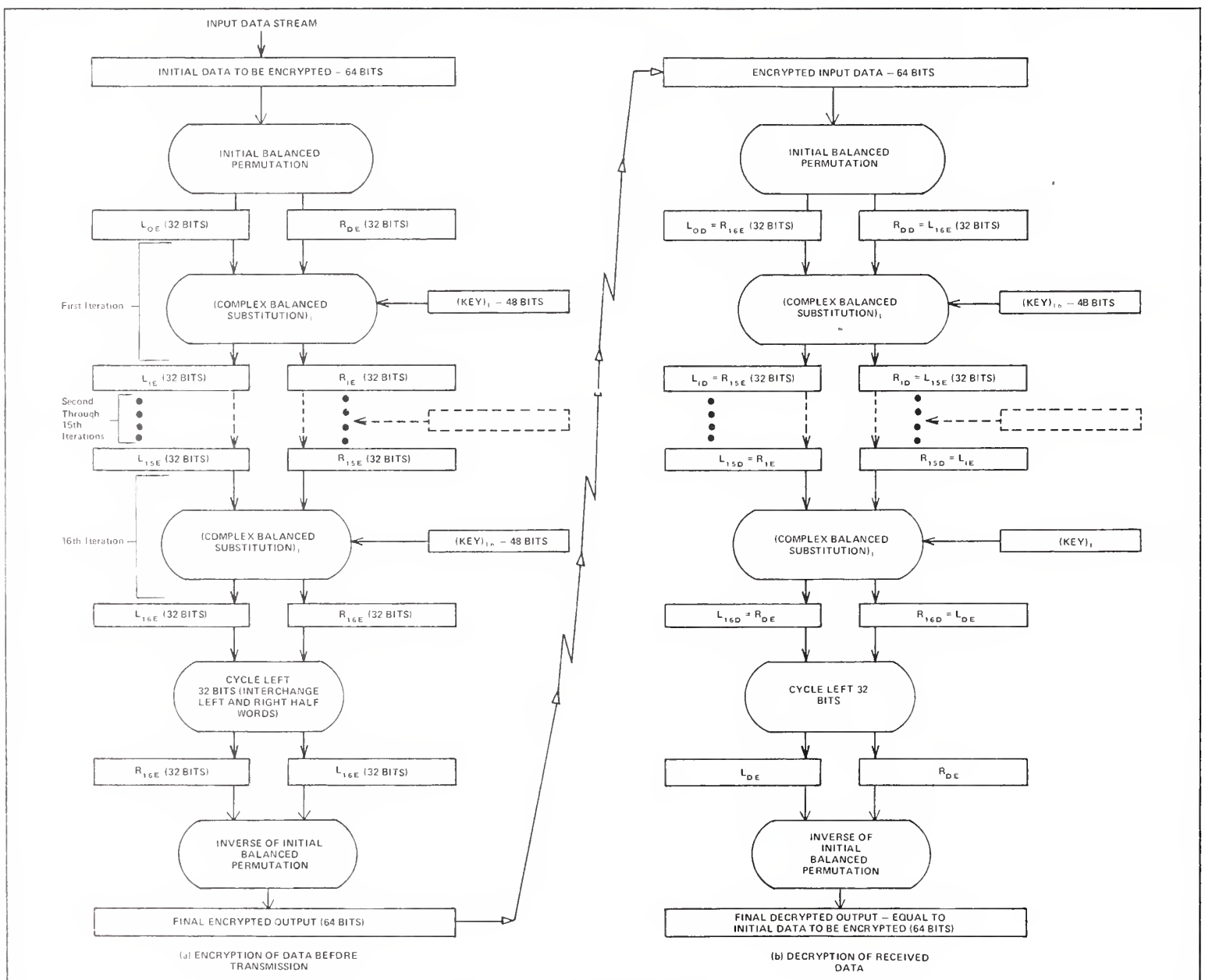


FIGURE 5 – ENCRYPTION AND DECRYPTION

Encryption Standard May Force Change In Systems Design

(Continued from Page 6)

serve bit values between input and output.

In fact, an invertible balanced permutation (Figure 1a) may be regarded as a balanced substitution (Figure 2a) in which the number of output 1s is equal to the number of input 1s and the number of output 0s is equal to the number of input 0s for every input bit combination.

The distinction between an invertible process and a noninvertible process may be seen in figures 3a, 3b and 3c. In Figure 3a, every output bit combination (000, 001 . . . 111) occurs only once, and every input bit configuration has a corresponding output.

With these characteristics, the inverse of the process can be constructed, as shown in Figure 3b.

By contrast, the process shown in Figure 3c is not invertible because the output configurations 110 and 101 occur

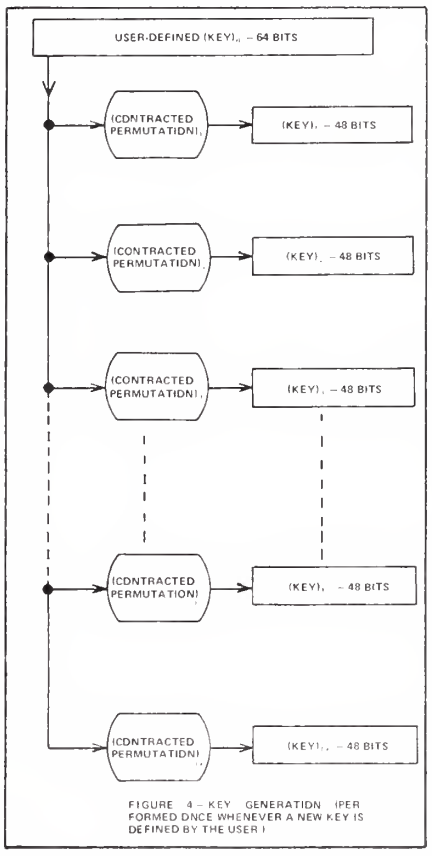


FIGURE 4 – KEY GENERATION (PERFORMED ONCE WHENEVER A NEW KEY IS DEFINED BY THE USER)

twice and the configurations 000 and 010 do not occur at all.

Thus, if an attempt were made to construct the inverse of Figure 3c, the outputs would be undefined for input values of 000, 010, 101 and 110.

The invertibility property may also be applied to permutations. A permutation is invertible if each input bit is tied to one and only one output bit.

The cyclic permutation, Figure 1c, is a special case of an invertible balanced permutation. The inverse of Figure 1c would be a "cycle right 1 bit" process.

As indicated in Figure 2, substitution may be regarded as a table lookup procedure which could be used if the function were performed by a microprocessor or could be realized by a network of logic gates.

As indicated in the standard, the method of implementation is up to the individual hardware designer.

Taking this one step further, there's no reason why such a function can't be executed by software on a general-purpose computer, although dedicated custom-tailored hardware will accomplish the task most efficiently.

The most intriguing class of substitution, the exclusive OR process, is shown in Figure 2b; a typical truth table is given in Figure 3d.

The process is not only invertible but

(Continued on Page 9)

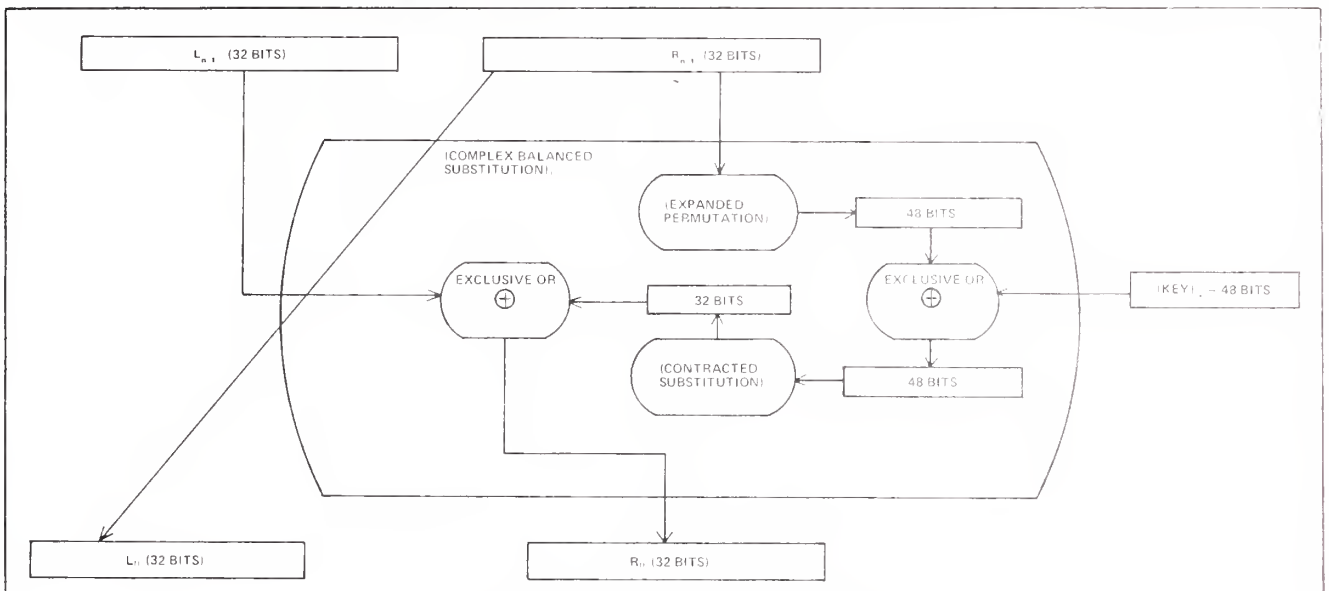


FIGURE 6 – DETAILS OF Nth ITERATION IN ENCRYPTION PROCESS

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OS/VS2 Release Enhances JES2 For 370 Users

(Continued from Page 1)

including all those introduced with Release 3.7, will be user-selectable without requiring a full-blown system generation, a spokesman said.

The OS/VS2 update features JES2 Release 4, under which JES support for IBM 3340 and 3350 direct-access storage devices includes a technique of track address allocation called Track Celling and provides simultaneious formatting of spool volumes, IBM said.

The installation procedure for JES2 has been simplified by eliminating JES2 generation parameters. Release 4 will use parameters defined by the system initialization parameter library to establish table values at initialization time rather than building the system through parameters set at generation time.

MVS Scheduler Enhancements

MVS Scheduler enhancements include improvement of the device allocation segment by reducing its use of other services.

Under Supervisor I, the way the I/O supervisor manages its memory has been improved with the intention of reducing the I/O path length in the system, the spokesman added.

The System Resource Manager has been extended, with additional control mechanisms to allow better installation control over the mixture of jobs being executed, he said. The Auxiliary Storage Manager has been enhanced to reduce CPU and fixed real storage required to do system paging and system swapping, he continued.

The newly implemented data management element inlcudes RESET CAT, an access method command which provides capabilities to reestablish a Vsam catalog.

Also included is an extended MVS Control Volume (Cvol) capability that provides OS Cvol support in MVS environments equal that already available in SVS situations, while retaining the Vsam master catalog as the only system master catalog.

In addition to the Release 3.7 features, some available previously are also "selectable units" under this plan as long as the user has 3.7 installed, IBM said.

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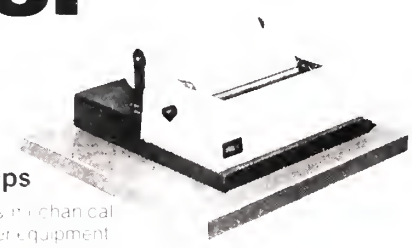

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NBS Standard Details Federal Data Encryption

(Continued from Page 7)

self-invertible. Suppose an input bit sequence of:

$a_n, a_{n-1}, \ldots, a_1, a_0$

produces a given output sequence of:

$b_n, b_{n-1}, \ldots, b_1, b_0$

If, instead,

$b_n, \ldots b_0$

is applied as the input, the output will be

$a_n \ldots a_0$

The process may be generated by a circuit which has two inputs — data and a key with equal numbers of bits. Then the output is obtained by a bit-by-bit modulo-2 addition (exclusive OR) of the key bits and data bits.

The bit-by-bit transfer functions is given by:

0 ⊕ 0 = 0;
0 ⊕ 1 = 1;
1 ⊕ 0 = 1;
and
1 ⊕ 1 = 0,

where the ⊕ sign symbolizes the exclusive OR operation.

In the encryption algorithm, as we shall see, the remarkable properties of the exclusive OR circuit permit a common logic to be used for encryption at one end of a transmission line and decryption at the other end.

To look at the exclusive OR process in another light, it may be noted that if Figure 3a represented the truth table of an exclusive OR function, then Figures 3a and 3b would have been identical.

The expansion and contraction operations, where the number of output bits is not equal to the number of input bits, are used in several stages in the algorithm, along with balanced operations.

Two-Part Algorithm

The algorithm is composed of two distinct subfunctions: key generation and encryption/decryption.

Key generation (Figure 4) is the process of transforming a user-defined 64-bit-key into a set of 16 different 48-bit keys, each to be used in a different iteration of the encryption/decryption procedure.

The proposed standard defines the input/output relationships of all the contracted permutations given in Figure 4, as well as all of the other permutations and substitutions of the algorithm. The substitutions (other than exclusive OR) are defined in truth tables, as in Figure 3, and the permutations are delineated by showing tables of input/output bit "connections," illustrated symbolically in Figure 1.

Each contracted permutation in Figure 4 is actually composed of a balanced permutation followed by a cycle left operation and a contracted permutation. The result is logically equivalent to a series of contracted permutations, as indicated in the figure.

Strictly speaking, a user could supply $(KEY)_1$ through $(KEY)_{16}$ directly, without building the hardware to perform the permutations, since all of the 48-bit keys can be predicted for any given 64-bit master key.

For example, an off-line program could easily print a series of keys that could be loaded simultaneously into the 48-bit registers, for each of a limited number of master keys.

Such an approach may be reasonable because the intent of the algorithm appears to be to use a given master key over a long period of time — a matter of hours, days or weeks, for instance.

This conclusion is inferred from the language of the proposed standard, which states, "Data may be protected against unauthorized disclosure by generating a random key and issuing it to the authorized users of the data."

This indicates it isn't necessary to supply a new 64-bit key for every 64-bit data block. That would require synchronization of the encrypting and decrypting key generators so the same key could be used to encipher and decipher each data block.

Instead, a federal agency with a time-sharing system or a remote batch operation can select, for example, a daily key to be used at each transmitting site and the central processing facility. Obviously, any private organization choosing to adhere to the standard can use the same technique for its own operations.

The encryption/decryption process itself is shown in Figure 5. It consists of several steps to be performed on each 64-bit input data block: an initial balanced permutation; a series of 16 iterations of a complex cipher, each iteration using a separate 48-bit key; a cycle left 32 bits (nothing more than an interchange of the left and right half-word); and a final balanced permutation which is chosen to be the inverse of the initial balanced permutation.

The decryption process uses precisely the same bit manipulation stages as the encryption algorithm. The only difference is that the keys are used in the reverse order, beginning with $(KEY)_{16}$ and ending with $(KEY)_1$.

Figure 6 shows the nth iteration in the encryption process, a complex function that encompasses permutation, substitution, expansion and contraction.

If the same process is used for decryption, it can be shown that

L_{OD} (decryption) = R_{16E} (encryption)

$R_{OD} = L_{16E}$, $L_{ID} = R_{15E}$

and so on. Thus, following the final exchange of left and right half-words and the final permutation, the output of the decryption process is equal to the input to the encryption process, where it all began.

It is worth noting the nature of the contracted substitution in Figure 6, which is composed of a set of eight so-called "primitive functions," each with a 6-bit input and a 4-bit output.

These functions are recommended for inclusion in the algorithm, so there's an implication the user can choose his own primitive functions or his own contracted substitution if he wishes.

This contrasts with the practice (in the proposed standard) of dictating all of the other bit manipulation functions, without any hint of freedom of choice for the user.

ACM Plans Rematch

NEW YORK — The election of a regional council member in the Association for Computing Machinery's (ACM) East Central area will be rerun because of voting irregularities, the ACM announced.

Marshall Yovits will square off against Orrin Taulbee in the race.

It was originally announced that Yovits won the post [CW, May 24].

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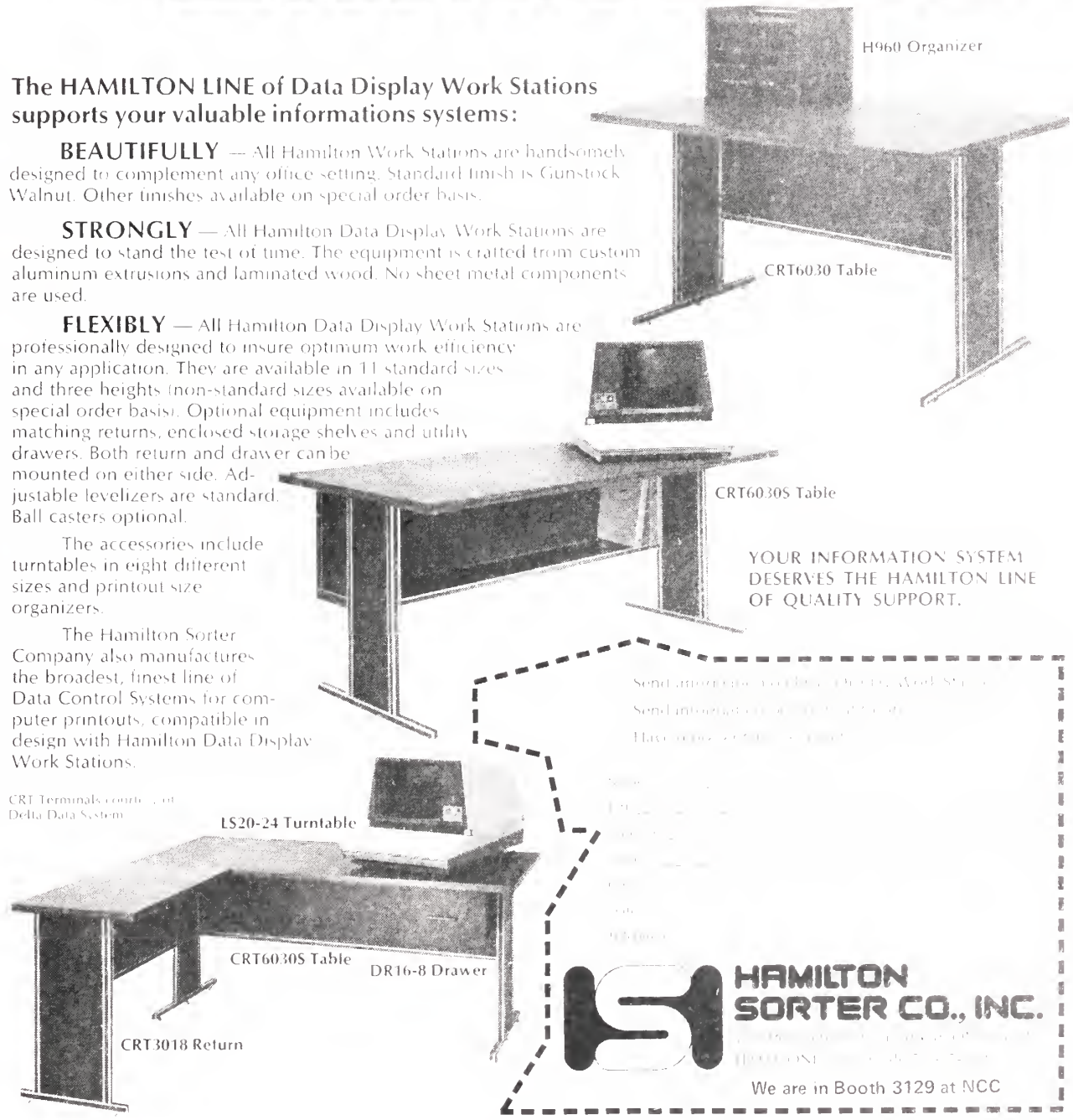

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Information Needs of Voluntary Agencies Changed

By Catherine Arnst
Computerworld Staff

CHICAGO — Voluntary human services agencies are faced "with a whole different ball game" than that of three years ago in terms of what kind of information is needed to function, Earl W. Fischer, executive director of Service Information Systems (SIS), said here recently.

Spotlight On Social Systems

Voluntary agencies today require greater accountability to the public, "it's no longer enough to be a good cause," he added.

Many agencies have found they need an information system, but don't have the capabilities or funds to develop their own. "Agency directors didn't know enough about DP" to know in which direction to go in acquiring a DP system, he continued.

SIS was formed three years ago by four Lutheran agencies to provide DP services for nonprofit social service agencies that found themselves in the situation of needing an information system, but not knowing how to get it, Fischer said.

It currently serves 25 agencies which range in size from annual budgets of $300,000 to $8 million. What SIS has learned is that "things that work for a $500,000 agency don't necessarily work for a $2 million agency," he said.

SIS modeled its system after the standards set by the American Institute of Certified Public Accountants and tried to develop flexible systems that would permit design to fit the individual agency needs. Designing one rigid system "may have been easier, but I also believe it would have been a mistake. It is quite impractical to try to fit agencies into a single mold," Fischer said.

'More Than Payroll'

The systems developed by SIS are geared to social services agencies and try to be "more than just a payroll package," he said. Instead, management information that is not usually gathered by hand is emphasized.

"We have deliberately avoided designing the systems to meet specific external reports," Fischer said. The systems are geared toward internal management needs, the theory being that if internal management needs can be satisfied, the needs for external reporting can be met even though the data may have to be extracted from several pages of printout, he added.

A Different Question

To determine the type of system required by an agency, SIS first asks it: "What do you want to know?" Fischer said. "Interestingly, this is often difficult for the agency staff to answer."

Once the data needs are determined, "we have found it is important to keep it simple. There is a wide degree of sophistication among agencies," and it is more important to design for the unsophisticated than vice versa, he said.

One problem SIS has encountered with the agencies it services is that "because of the flexibility of the systems, agencies tend to use the computer to do everything without examining the cost of that philosophy," Fischer said.

Lack of Understanding

There is also "a basic lack of understanding on the part of the agency's management of the purpose of data and information," he said.

"I have had agency administrators ask for printout format designed so they can simply hand it to the board without having to do anything with it. Or, they ask, why can't the printout be designed so we can send a copy directly to the funding body? There is no recognition of the need for management to study the data to determine what it means," Fischer said.

A second problem occurs when the administrator decides to make use of the system, but the bookkeeper "is convinced the computer won't work. When that situation exists, the computer doesn't work," he said.

On a more positive side, SIS provides social services agencies with management information at a lower cost than if the agency added the staff to produce that information by hand, Fischer said.

SIS also acts in a management capacity for agencies in helping them develop the kinds of information they need, he said. "Our goal is to aid the agency in providing more and better service for people in need," he concluded.

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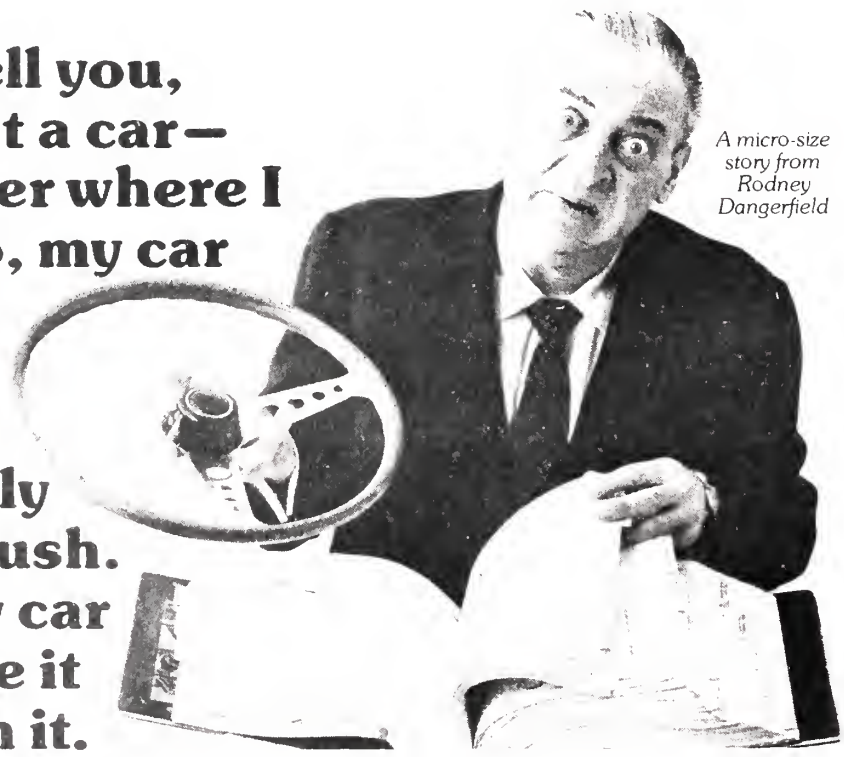

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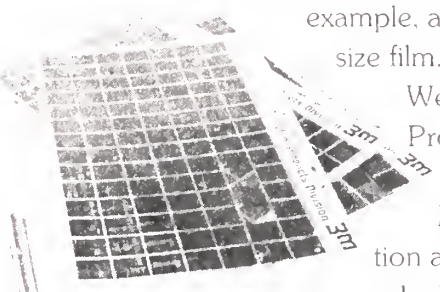

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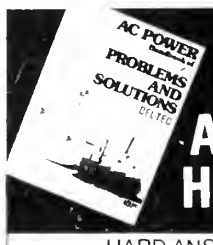

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Private Agency Funds Prototype System To Keep Inventory on 'Lost Children'

By Catherine Arnst
Of the CW Staff

NEW YORK — The lack of a good management information system (MIS) in child welfare has resulted in "children falling through the cracks in the system." They are lost because no one knows whose responsibility they are, what programs they are in, what services they need or even if they exist.

Spotlight On Social Systems

These assertions have been made by several people in the child welfare field, including Peter Forsythe, vice-president of the Edna McConnell Clark Foundation here. The foundation is funding the Child and Youth Center Information System (Cycis), a national prototype of a child welfare system.

"Every state has some sort of public- and private-sector handling of children; these sectors should work together to integrate approaches because they are dealing with the same children.

"Where those sectors are separate at present, you can't even count how many children are in the system or keep track of services provided," Forsythe said.

One case of losing track that he cited was in Massachusetts, where an independent study showed 30% of the children in the state's care have no caseworkers assigned to them.

The high turnover of caseworkers is another reason why children get lost in the system, Forsythe said. He cited the turnover rate of the average worker in child welfare as 18 months, whereas the turnover rate of the average child is four to five years.

Inventory System Needed

"What the field needs is an inventory system, and it doesn't have one. To delay having one any longer with the technological capabilities available is inexcusable," Forsythe said.

Developing an "inventory" system for children is not a simple task. Besides trying to deal with the jurisdictional problems of including both private and public agencies, a common terminology must be developed that both sectors can be comfortable with; the information must have stringent privacy protections so a child will not be marked by subjective or outdated information, Forsythe said.

Some effective "inventory" systems have been developed that deal with children in both the public and private sectors. Here in New York City, a privately developed and administered system handles foster and adoptive children; in Michigan, a state-run system encompasses children in the juvenile justice system in addition to those out of their homes (see stores on Page 12).

Both of these are part of the first generation in child welfare systems; Cycis is meant as the second generation, Forsythe said.

Cycis was modeled after Michigan's system in that it focuses on all children either out of their own homes or where a court or state has intervened. It is funded privately as an effort to come up with a detailed framework of specific design for a child welfare system that could be adapted by any state, Forsythe said.

The effort was aimed at designing something that was not hardware- or software-based but did contain certain common data element standards and a compatible core of information, he said.

Completed in the spring of 1975 and designed to be implemented in several states last summer, the plan was aborted, however, because of political complications, Forsythe said.

"Interest is still very much alive, though, and we are on the verge of reviving the original deal," he said. If this works out, a consortium of 18 states would start to adapt the system and it would take a minimum of 18 months to implement and that's "if everything goes well," Forsythe said.

Focuses on Workers

Cycis was designed to focus on the worker responsible for a child; the reports and information generated will be available to both management and field workers so performance can be monitored.

Information will only have to be entered into the system once, Forsythe said. "It absolutely has to eliminate a great deal of paperwork. It will fail unless it does," he said.

"Much of the diversity and duplication existing now in the child welfare area is unnecessary, counterproductive and the result of isolation. We are trying to encourage elimination of confusion.

"But unless you have a multidisciplinary approach, the system won't work," he said.

An important aspect of a prototype system is that it be flexible enough to deal with all the vagaries and contradictions of terms existing between the jurisdictional and geographical sectors, Forsythe said. If a rigid set of standards is developed and everyone is then told they must use it, "enormous political and some practical problems are created," he said.

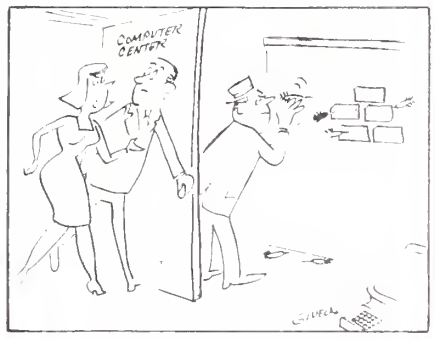
"We are talking about a modest system that is fairly simple so social services people won't be afraid of it. It can't be designed by systems people and imposed on services people," Forsythe said.

Hopefully, what a national standard for child welfare systems will do is bring objectivity and accountability, he said.

"We are working under the assumption the state has already intervened in the child's life when a name is in the system. That child must be sure that intervention is appropriate," he said.

With Cycis, Forsythe predicted that not only will there be a check that intervention is appropriate, but that the proper type of intervention is performed and the child is not doomed to remain in the state's care forever.

The Cycis system was designed to help children whose lives have already interfaced with the system, the idea of building a system that can find a child and possibly help it before intervention is "a scary thing," Forsythe said.



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SERVICE

System Handles All Children in Michigan's Jurisdiction

By Catherine Arnst
Of the CW Staff

LANSING, Mich. — A system has been developed that handles all children under this state's jurisdiction, including foster children, those available for adoption, those in the juvenile justice system and any child who is still living at home but where the state has intervened.

Spotlight On Social Systems

There are approximately 36,000 children in the Child Care and Placement Information System (CCPIS), which has changed the focus of reporting in the state in child welfare.

Prior to CCPIS, each case within each agency was counted; now "kids are counted," according to Beth Lott, control unit supervisor of CCPIS.

"The basic philosophy of CCPIS is that it is a tracking system. The criteria are who's got the body and how long it takes for a child to go through a program," she said.

CCPIS was started in April 1972 and then redesigned; the second version has been up since December 1973. Three sectors are included — the state Department of Social Services (DSS), juvenile courts and private agencies; data is input from 83 courts, 83 regional DSS offices and 97 private agencies.

In Michigan, the problems with CCPIS emerged from dealing with the different agencies involved. When the system was implemented, there was no mandate requiring everyone to work with it, Lott said.

"There was no one head of the whole thing. In the juvenile justice sector, cooperation depends on what the individual judge says; some private agencies didn't want to be involved at all.

"In the beginning there was much resistance. We have just begun to overcome that resistance in the last six months. The turnabout resulted when the workers realized the system worked. Then they were willing to accept it," she said.

Now the biggest problem is "somehow convincing social workers to do their paper work precisely. Improperly recorded data creates a lot of problems," Lott said.

With CCPIS, there is a single data base for all three sectors and each piece of information on each child is input only once.

The personal information contained in the data base is limited to either an identifying or legal nature. Any other possible subjective or harmful information on a child's personal life is prohibited, Lott said.

N.Y. Program Backs Private, Public Sectors

NEW YORK — A privately administered automated child welfare system dealing with foster and adoptive children in both the public and private sectors has been in operation here for three and a half years, and there is currently a bill before the New York State Legislature which would make it a statewide system.

The Child Welfare Information System (CWIS) was started by a group representing public and private agencies, according to Michael R. Diem, coordinator of systems development for CWIS.

There are 28,000 foster children in New York City, which is 15% of the total number in the country, he noted.

CWIS was formed as a nonprofit corporation which now operates on a contractual basis with both the public and private sectors. "The strength of CWIS is that it blends and responds to both public and private needs," Diem said.

The people who must work with CWIS, however, often feel they don't need it at all, he added. "The biggest problem is the fears of the human services community with having a data bank. They fear a child would be permanently labeled by a computerized system," he said.

Records are purged once a child leaves the system and there are hardware and software controls for access, but these controls are minimal, he admitted.

Still, the people working with the system often won't participate in a positive way and they can "easily screw up the software by discording information," he said.

To overcome the resistance, "you must be sure you have one-to-one contact with the people using the system. They must understand computer concepts, or you are doomed to failure."

And CWIS has found some lost children. One example is when the data on 150 children who needed to be adopted but weren't in the adoption files was recovered with CWIS. "Those children now have a chance for a permanent home," Diem said.

Finding a permanent home for children is the intent of CWIS. "Child welfare can be a trap — once you're in it, it's hard to get out," he said. CWIS is meant to be a tool with which to either return children to their own home or find a permanent home.

It's 340 in Poughkeepsie, 350 in Des Moines and 440 in Los Angeles.

SYCOR INC

Division Marks Entire Industry

Afips Membership Split on Copyrighting Software

By Toni Wiseman
Of the CW Staff

Spotlight On Copyrights

WASHINGTON, D.C. – If the opinions of various associations within the computer industry are somewhat divided on the question of whether software should be copyrighted, so are the opinions of members within a single association.

Three groups representing the American Federation of Information Processing Societies, Inc. (Afips) – the Data Processing Management Association (DPMA), the IEEE Computer Society (IEEE/CS) and the Association for Computing Machinery (ACM) – responded to questions raised by the National Commission on New Technological Uses of Copyrighted Works (Contu).

Speaking on behalf of ACM, Herbert S. Bright commented the essence of the difference in position between segments of the membership is that "some feel complete freedom of information transfer and knowledge usage is in the public interest, while others feel encouragement of product development by protection of investment in programs, making [possible] low-priced licensed usage of broad-applicability programs, is similarly in the public interest."

Contrary to the majority of opinions expressed to Contu, Bright stated that "the making and distributing of copies [of programs] does not entail a significant part of the protection problem, which irrespective of one's opinion on desirability of any protection is economically important [as] and only as, it relates to execution of a protected program."

While noting that present law may be unenforceable, Bright said some feel that protecting a specific implementation, when invention is not involved, could be accomplished through specificity of new laws without undue restriction on use of generally known ideas.

DPMA Against Patents

William J. Moser, on behalf of the DPMA, was much more forceful in his opinions, stating the DPMA believes programs should definitely be copyrightable – but not patentable.

"However," he added, "there is a question in the minds of many of our members as to the desirability of allowing patents on the operating [or overall] system."

On the [illegible] number of [illegible] of a cross-section of DPMA members, Moser said the type of protection afforded software should not vary according to the program.

In addition, DPMA members feel copyright protection should be extended to the right to make archival copies and there must be a more distinct line between a [illegible] copy and the original program in order to exclude that copy from infringement.

"Many [illegible] defined as not more than (approximately) 50 [illegible] steps of the original program in their original sequence.

"With regard to the right to use, [DPMA's] response depends on the definition of 'use,'" Moser said.

"If 'use' means the execution of a program obtained not by copying, but by some other means (e.g., theft of an existing copy), then copyright protection should make such use illegal.

"If, however, 'use' is defined as writing a similar program (or a substantially different program) to make a computer achieve the same result as it would in execution of the copyrighted program, such use should not be illegal."

The IEEE/CS presentation to Contu dwelt at length on the question of definitions of software, particularly in relation to firmware and integrated logic circuitry.

The first problem the IEEE/CS brief noted, is whether to define a program as an instruction listing, an algorithm, an executive program, a complete operating system, a turnkey system or a [illegible] communications system.

"Third [illegible], the question of ownership of the information or [illegible] program is contrasted [illegible] that into [illegible] classes of [illegible]," [illegible] Mr. Nerlinger, Mr. [illegible] Keller representing the society.

They contended that specific copyright [illegible] contract to some new legal entity, must depend on the type of program regarded, not by its economic value or its complexity but on other factors.

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Cbema Backs Passage

Bills Would Make Programs 'Properly Copyrightable'

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. "Computer programs are currently copyrightable and, if they will be properly copyrightable under the terms of S. 22 and H.R. 2223.

"Not only that, [the Computer and Business Equipment Manufacturers Association (Cbema)] believes computer programs should be explicitly declared [subject to] copyright [which is] particularly apropos as a protection mechanism for computer programs because programming involves the writing of an author and because the primary exposure for the proprietor is the case of copying by others."

Spotlight On Copyrights

Thus Peter F. McCloskey, president of Cbema, summed up that body's position on the applicability of copyright protection to computer software before the National Commission on New Technological Uses for Copyrighted Works.

S. 22 and H.R. 2223 refer to pending copyright law revision legislation in the U.S. Senate and House of Representatives.

Without legal protection, the proprietor of a program is at the mercy of anyone with an office copier or any machine-readable media duplicator, including a computer, he noted.

While Cbema has in two past instances encouraged a definitive judicial decision on the question of program patentability, the area remains unclear since few programs fulfill the novelty and unobviousness requirements of patent laws.

Cbema's position is that computer software should be treated as much like analogous copyrighted works as possible, including that the length of time for copyright protection should be the usual time provided by the copyright law.

McCloskey compared computer programs to musical and dramatic works in terms of copyright coverage since they are "performed."

"Thus we urge that copyright protection of computer software should not be limited to the right to make and vend copies of the program," he said.

"A single copy, once sold, can pass through many hands, and some means must be provided for preventing it from being effectively copied by each holder through being input into his computer where an executable copy would continue to reside after the original program copy is passed on," McCloskey said.

Legislation should provide that the inputting of a program into a computer constitutes copying, which requires authorization by the proprietor, he said.

"Thus, copyright protection should include the exclusive right to make copies by recording within a computer. There would be no objection to the right extending further to the use of a program to operate a computer in a manner similar to the performance right in the musical or dramatic work," he said.

Since copying is a key issue in the proposed legislation, Cbema has proposed an amendment to Section 106, which outlines the exclusive rights of the copyright owner.

The amendment would read: "In the case of a data base and computer program works, to read into, to store or reproduce for storage the work in automatic systems capable of storing, processing, retrieving or transferring information or any similar device, machine or process" would be the rights of the copyright owner.

This amendment would cover recording onto machine-readable media as by keypunching cards, duplicating machine-readable media such as punched cards or magnetic tapes, inputting a program into a computer from human or machine-readable media or inputting a program into computer memory for execution.

Existing Protection Under Patent Laws Seen as Inadequate

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. Patent protection is available for software products under existing law, and further protection is available under state trade secret laws, according to Carol A. Cohen, general counsel for Applied Data Research, Inc. (ADR).

However, while trade secret, patent or restricted contract protection is sufficient for some firms, "those who develop [software programs] at tremendous cost do need the protection afforded by copyrighting," she said.

Protection, no matter what the form, is needed because of the ease of reproduction, she said.

In addition, the software industry is a developing industry with many small businesses who cannot and will not be able to afford the tremendous investment necessary to develop software packages unless they are assured of complete proprietary protection.

The value of trade secret protection relates to the size of the market, and continuing and conscientious efforts to maintain secrecy become difficult when the proprietary product is being disseminated over a large market. This is particularly true when the product is being disseminated in foreign countries.

While ADR was the first in the industry to obtain a patent for a software product (Autoflow), and the company continues to copyright all its proprietary products, Cohen said she would still like to see modifications in the copyright law to further clarify and deal with protection of software programs.

Specifically, she believes a whole new class should be developed relative to computer software.

"I believe there should be specific inclusion of the definition of the form in which this writing can occur," Cohen said.

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Better Program Protection Needed to Avoid Waste

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. – Without better methods of program protection and broader means of public disclosure, "we are bound to waste our resources, chance the stifling of software productivity in the future and forever 'reinvent the wheel,'" according to the Computer Industry Association (CIA) and others testifying before the National Commission on New Technological Uses of Copyrighted Works.

Spotlight On Copyrights

Speaking on behalf of the association, CIA President A.G.W. Biddle could not offer a "best solution," listing rather the pros and cons of trade secrets, patents and copyrights.

"To the large data management system supplier whose main concern is to minimize the risk of loss, trade secret protection is the only feasible means currently available," he said.

"Still other manufacturers favor patents to protect their software products. In short, we have discovered there is no consensus in the industry."

Patent laws, protect the invention or discovery of an idea by giving its creator a legal monopoly over its use, while copyright laws do not protect an author's idea, but only the author's embodiment of that idea, Biddle said.

This means that, with software, copyrighting offers a very limited means of protection since competitors need only reembody another's ideas in some other noncopyrighted program, he said.

Patent protection, on the other hand, would give the greatest security on a software product since it would protect the creator's idea regardless of the form in which it might become embodied, he said.

Patent laws, however, provide only an incomplete answer to the question of software protection, Biddle noted.

Many inventions, for example, cannot satisfy the requirement of nonobviousness as a standard of patentability. In addition, there is the problem of how to effectively search the prior art if software patents become a reality, he said.

"Additionally, the delays between filing and the ultimate issuance of a patent, typically about three years, overlap the useful life of many innovations," Biddle said.

Must Broaden Concept

Copyrighting is not the ideal answer either. "The copyright laws must be made more responsive to the technology of computers and information processing if they are to benefit the software suppliers.

"The concept of copying must be broadened to include not just the actual reproduction of a computer program, but its transformation into magnetic or electronically coded storage as well," Biddle said.

Additionally, the translation of a program into a different computer language should constitute a copying for the purposes of copyright infringement. And perhaps even any transformation between diagrams or flowcharts and the program text or vice versa should constitute copying under the copyright law, he said.

"There has been a favorable response from some of our members to the notion that a new registration program akin to the copyright system should be devised specifically for software products, Biddle said.

"Under such a system, it is suggested that only software programming concepts and not the actual coding be disclosed. Registration should only be permitted if these concepts represent a sufficiently complex process to warrant protection based on originality," he noted.

Under this scheme, a panel of experts would make the final determination before authorizing registration as well as acting in subsequent infringement suits.

Biddle noted several points against copyrighting software, including the fact that much systems software is created by the hardware manufacturer and is price bundled. Many of these programs will work only with a particular machine, thereby diminishing the probability that a copier can sell his "illegally obtained merchandise" at a profit.

Also, since many of today's application programs are written in-house to suit individual needs, the software is of such a specialized nature that copies would have little significant marketing potential.

"Those application packages which are not tailored to a specific user's needs, but rather are marketed as general-purpose programs come with documentation, manuals, warranties and services," Biddle said. "The cost of these supporting items may equal or exceed the program's initial cost.

"These facts suggest that a user is often buying services and expertise as much as the particular programs themselves. Thus, the ill-gotten gains that may accrue to a copying seller who is unable to provide the concomitant services and expertise will be minimal," he said.

Copyright Cost a Problem

Administrative considerations such as the "transaction cost" problems for producers who copyright nearly all their creations are points against copyrights, too.

"Almost all of the association member companies agree that trade secrets offer the most reasonable means of product protection," he said.

"The real advantage which trade secreted software has over copyrighted software is that, because there is less access to the product, there is less opportunity to steal and, hence, the problems connected with detection of unauthorized use are thereby reduced."

But here again problems arise such as what constitutes adequate protection of secrets from disclosures and, because of the diversity in hardware systems and the size of the potential user market, it can often be uneconomical to meet these standards of protection, he said.

"Several suggestions have been made that if these problems could be solved, perhaps through federal legislation, there would be little need to pursue the copyright solution any further," he said.

Biddle suggested that encryption might be a solution to many of the problems, since the use of a standard encryption technique would constitute prima facie evidence that a supplier had adequately protected his trade secret.

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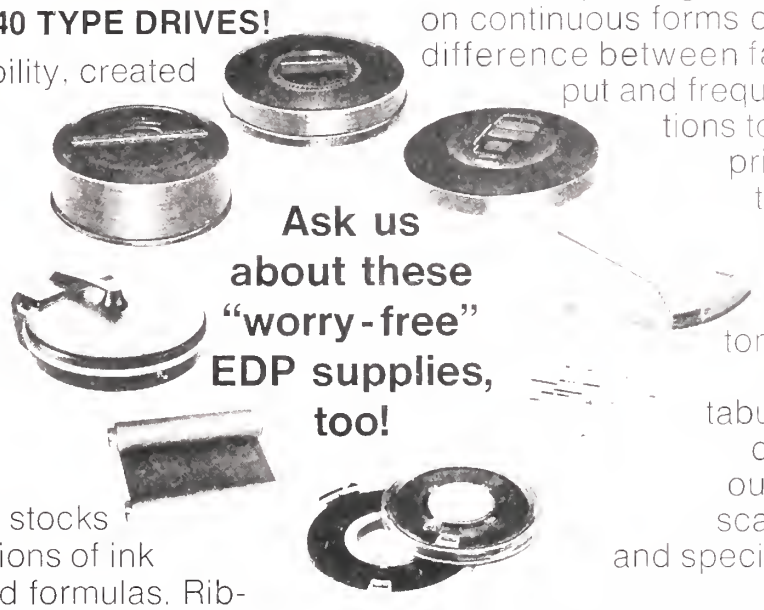

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It Made All the Difference

NEW YORK — All the computers in Armonk won't produce the right answer if the mathematical model being processed is based on wrong assumptions.

That's the lesson TV news executives and a host of newspapers learned after they named Morris K. Udall rather than Jimmy Carter winner of the Wisconsin primary election.

Richard Scammon, a consultant for NBC-TV news here, told "Today Show" viewers the next morning that NBC had made its projection on the returns from 100 key precincts without considering the extent of Carter support in areas where votes were cast on paper ballots.

Paper ballots must be counted by hand and thus were the last to be reported.

TV network executives called the goof a "human error," pointing out that, regardless of technology, the final decision when naming a winner is still based on human judgment.

ABC-TV was the first to call Udall the victor, interrupting its program "The Rookies" at 9:27 p.m. to do so.

NBC made no announcement until 10:22 p.m., but at that time it also predicted Udall the winner "by a modest margin."

Despite pressure to keep up with the competition, CBS-TV refused to make any prediction until 2:30 a.m., when it declared Carter the winner. By then, East Coast TV affiliates had shut down for the night and only West Coast viewers got the news.

CBS, which received data from sample precincts throughout Wisconsin and entered it into its computer much like NBC did in New Hampshire [CW, March 1], saw a very narrow Carter margin all evening, but it was not large enough to be "reliable," a spokesman said.

However, the early vote results came from Milwaukee, Madison and their suburbs, where more up-to-date voting systems were employed.

The farm vote made the difference.

Service Gathers Tallies For Major News Media

By Nancy French
Of the CW Staff

NEW YORK — No national news organization can broadcast or print election results without having some way of gathering tallies almost as soon as the polls are closed.

Spotlight On Election Systems

Rather than gathering the results individually, the three major television/radio networks and two wire services pooled their resources and established the News Election Service (NES).

NES services the American Broadcasting Co. (ABC); Columbia Broadcasting System (CBS); the National Broadcasting Co. (NBC); Associated Press (AP) and United Press International (UPI).

The service has developed a complete network of people and equipment to receive precinct totals, keypunch the data, tabulate it and then disseminate it to its five member organizations. Members then disseminate that information still further.

Although NES employs only about 12 people year-round, on election night its ranks swell to nearly 9,000 employees and 10,000 volunteers, according to Dick Eimers, NES executive director.

In exchange for a contribution, civic groups (such as the Jaycees), church groups, teachers' associations and business and professional organizations provide volunteers to report election results at the precinct level as those tallies become available.

In a national election in which all 50 states must be covered, paid reporters are assigned to phone in results from about 100,000 polling places, Eimers said.

A second team reports tallies from election board tabulation centers in major cities and counties to give NES a check against the figures reported by the first team, he added.

Six NES "collection centers" — one each in Chicago, Cincinnati, Dallas and Baltimore and two in New York — are staffed by about 3,000 NES employees who put telephone reports on paper for keypunch operators.

After keypunching on IBM 029 and 129 keypunch equipment, the data is transmitted via IBM card transceivers to the computer center in New York.

Data is received by IBM 3704 communications front ends and processed on dual IBM 370/155s; totals are turned around and output to the five members' own computers.

Most members receive that data on Teletype Model 40s.

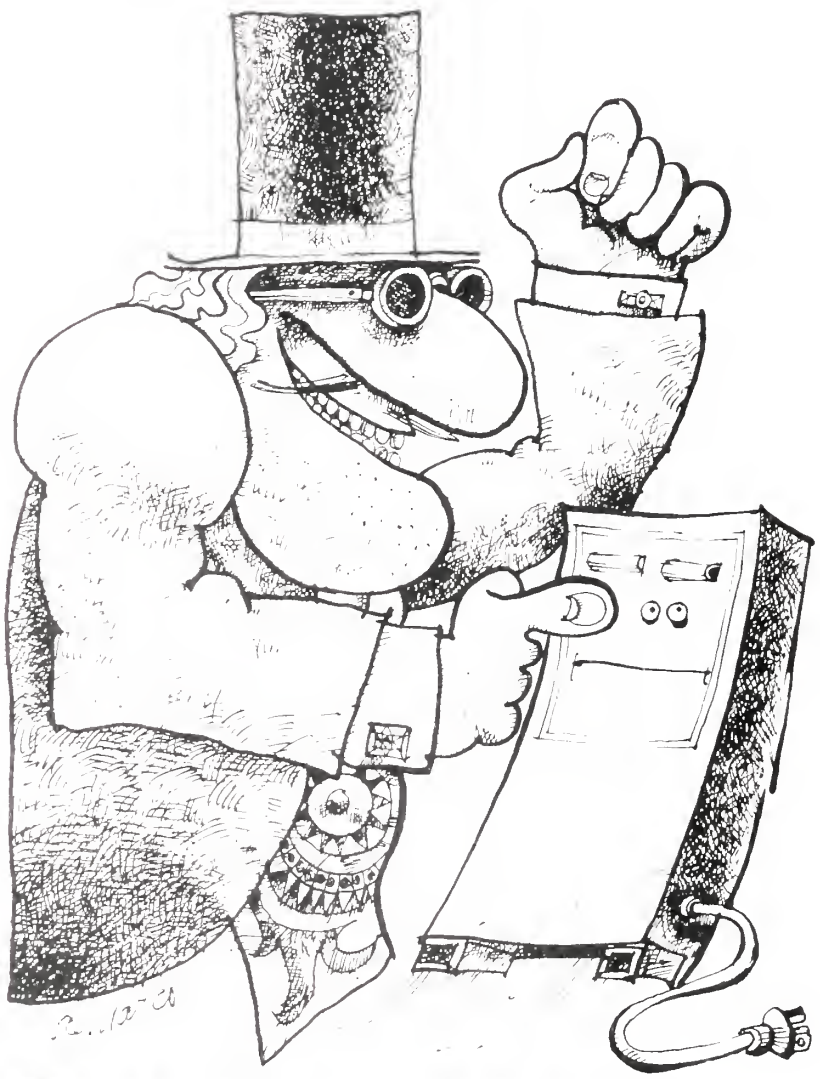
NES provides its members a new presidential report every 60 sec and new county totals for every county in the nation every 15 min. State totals for President, senator and governor are updated every minute and the results of the 435 congressional races are updated every 10 min.

First Line of Defense

The dual-processor system is NES' first line of defense against system failure, according to Eimers. If the system should fail, NES staffers are prepared to go to a manual system.

"We provide only the hard factual totals — all projections and analysis is left to the members," Eimers noted, adding that vote counting continues until all elections are decided, which is usually the following night.

The numbers provided by NES are all unofficial totals, and members usually replace them with official totals when they become available for archival purposes, he said.



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County Writes Own System to Handle 750 Candidates

By Nancy French
Of the CW Staff

PHOENIX – Conducting an election where voters will consider 750 candidates ranging from President of the U.S. to justice of the peace involves far more than counting the ballots.

Spotlight On Election Systems

That's why Maricopa County officials here wrote their own election system software this year to replace the Computer Election System (CES) package used in previous years, according to Michael S. Griffin, director of the county's Information Systems and Services Department.

CES programs used in the past were more than satisfactory, Griffin said, but they were originally designed for IBM systems and later generalized for use on all the major manufacturers' systems. They are therefore somewhat less efficient than programs written for the county's Honeywell H6000 gear, he said. "What's more, we don't have to call California and have [CES] call a patch card back to us when something doesn't work just right," he said. "Our people here can do all the work."

The election system is comprised of four phases: The first is data entry, which involves helping the Board of Elections build a data base of candidates who have filed.

The second phase involves printing the 12-page ballots used by each voter. Phase three is ballot counting, and phase four is postelection reporting.

Of the four, the first two phases require the most complex and time-consuming computer programs, according to Herb Carney, who, as the department's Techniques Manager, heads the election unit.

Candidates have been registering in person at the Elections Department office, where the necessary transaction forms are filled out. This data is entered daily into the computer, where it is stored temporarily on three indexed sequential processing files.

After the candidate filing period closes in mid-July, the DP department will begin to validate the data base. When all candidates are finalized, the final data base will be built and sample ballots and candidate mailing labels will be printed.

Each candidate will be mailed a sample ballot to assure his name, or whatever nickname he chooses to use, are spelled correctly, Carney said.

Candidate Rotation

When the samples are returned, the data base will be corrected and candidate rotation performed, Carney said.

"By law, every candidate running for office has to appear in every position on the ballot in an equal number of precincts," he explained. This gives each an equal chance at the voter who doesn't know the candidates and merely votes for the name at the top of the list.

The rotation function also builds ballot records keyed by precinct number.

Next, programs will be run to determine how many unique types of pages – actually 80-column cards – must be printed and assembled into the ballot booklets and what formats each page will have.

These page reports will then be delivered to the printing contractors along with exact quantity specifications for each page to be printed and instructions for ballot booklet assembly.

On election day, voters will cast their ballots by punching out perforated holes in the voting booklets.

At 7 p.m., when the polls close, precinct workers from the Board of Elections will account for every ballot, including damaged ones, and deliver the ballots in sealed metal boxes to a receiving station where the contents will be inspected and precincts logged in.

Back at the DP Department . . .

When the cards are received at the DP department they will be stacked, separated by precinct using a diagnostic card and then placed in trays for reading by Documentation Model 1000L card readers.

As long as the diagnostic card at the end of each precinct reads correctly, operators will know the reader is working perfectly, Carney explained. If trouble is spotted, reading will be stopped.

Data will be multiplex onto magnetic tape by two 8K Digital Control Corp. Model 116 minicomputers. Tapes, each containing about 6,000 ballots, will be unloaded at 10-minute intervals.

The H6000 will read in data, sort it by precinct and put totals out on disk.

When key precincts come up, the DP department will output key precinct reports used by the news media to predict the probably outcome of the election, Carney said.

The reading, writing onto tape and processing of the 10-minute reels will be repeated over and over until all the ballots are tabulated.

Tape backup will also be used for extra security.

With approximately 525,000 ballots to count from 502 precincts, the automated tabulating system will move far faster than the election officials who have to deliver the ballots from outlying precincts, Carney said.

Despite this problem, DP officials have ruled out use of remote data entry techniques for reliability and security reasons. As an additional safeguard, the H6000 used to process the votes has no communications access.

Within 48 hours, absentee ballots as well as those cast by voters who were mistakenly left off the registration list will be processed and the final tallies printed out.

Although the new software has yet to be used in a national election, DP staff members have "run more test data through the system than we expect to get election night," Carney said.

The first test in an official countywide election will come in September's primary election.

The county spent $140,000 to develop its election systems software, including both machine time and programmer hours, Griffin said, noting it would have cost $177,000 to purchase the CES package. That package also rents for about $27,500/year for a county of Maricopa's size.

The multiplexing preprocessing system, along with the Votomatics, were purchased from CES.

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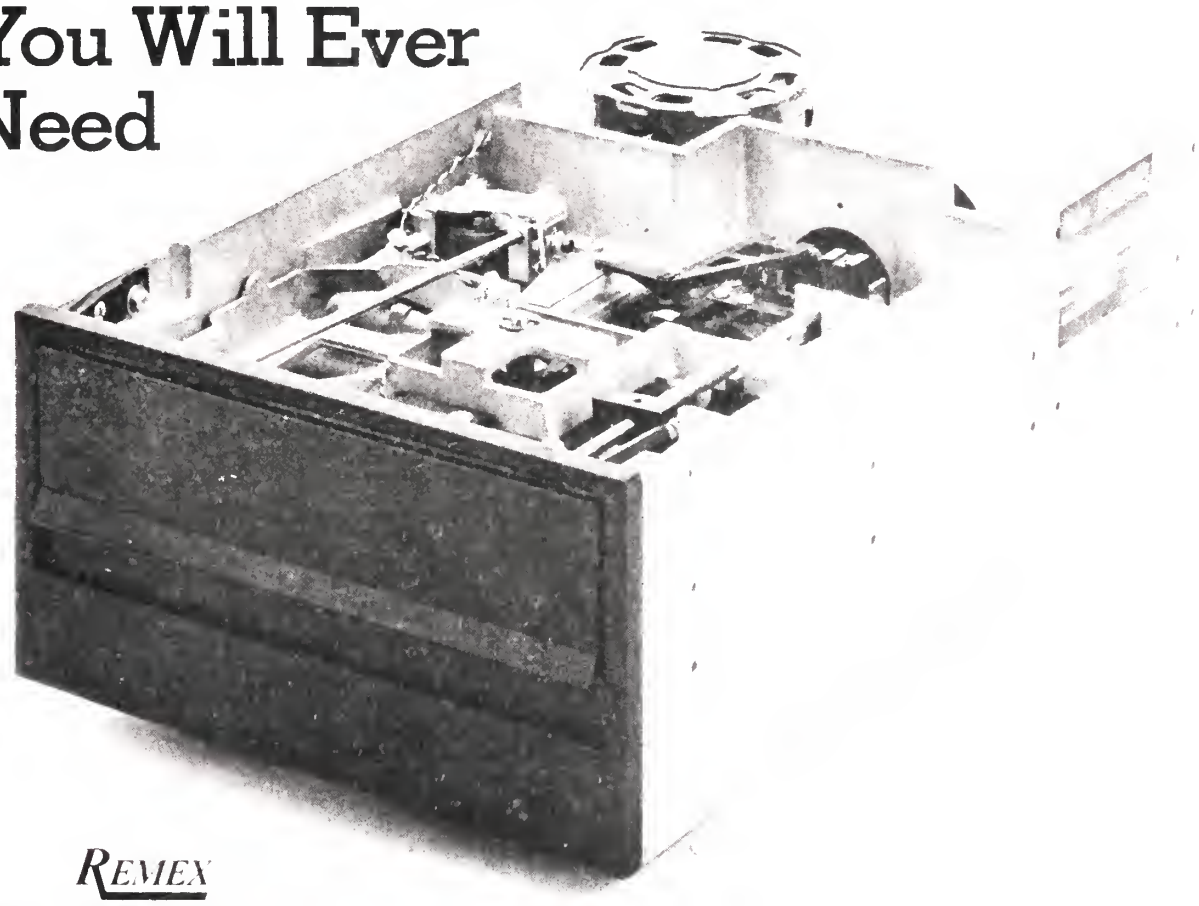

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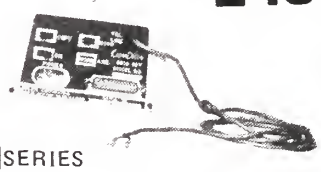

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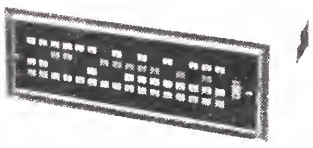

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DP Works Behind the Scenes at Firms Conducting Public Opinion Surveys

By John P. Hebert
Of the CW Staff

While presidential candidates are holding center stage this year, the organizations which chart public opinion are also in the limelight as they attempt to label the factors responsible for each candidate's projected vote-getting in a certain primary.

Spotlight On Election Systems

And behind the scenes at these public opinion polling outfits, the computer is no stranger. It is one of the constants – a research tool involved in determining the results of every survey.

These systems have a meticulously controlled fairly steady input of figures, sifted from answers to both simple and complex questions posed to selected segments of the population.

One thing in common at two of the three organizations contacted to find out how computers are used for their polling purposes was that the people who deal with computers came into their present capacity from the market research side of the fence, rather than from the DP side, Jim Cleak, DP manager at the New York firm of Daniel Yankelovitch, Inc. said.

"The [polling] industry's use of computers is very unique and the needs are unique," Cleak explained.

This brand of approach to computer-based processing of poll results was reflected by the staff at the first such polling firm established, The Gallup Organization.

Employees there who deal directly with the computer end of the business include one full-time and one part-time operator, four keypunch operators, three specifications writers and Steve Oberheim, who is director of systems and operations.

At the Manhattan, N.Y., firm of Louis Harris and Associates, Inc., no computer processing is done in-house presently, according to David Neft, chief statistician for the survey firm.

At all three organizations, it is not surprising that public opinion polling of political issues is not the companies' mainstay.

Rather, commercial applications aimed toward market research are the staple workload for the pollsters' computers.

For each Gallup Poll (a term which became a household word about 10 years after the firm's founding by George Gallup in 1935) an IBM 1130 computer and related IBM keypunch, card reader, disk drive and chain printer equipment handle 99% of the organization's data processing workload, Gallup said.

The system helps tabulate about two survey releases each week or about 110 releases yearly for 140 or 150 subscriber newspapers, according to the organization's founder.

In the last five months, The Gallup Organization has completed nine or 10 national syndicated political opinion surveys.

Although there is a problem with more figures and more complex figures when dealing with political opinion analysis – which accounts for only 10% of Gallup's business – the 1130 system handles those in-depth cross-tabulations too, Oberheim said.

Compilation of the survey results typically takes about three hours for cross-tabulations of the data, including data editing, going through verifying punches and weighting of samples. Four to five hours of machine time are then needed for a full-scale run of the data for a "normal" survey, Oberheim said.

These estimates also represent the machine time for a new polling procedure this year involving in-person interviews conducted at 300 sampling spots at local primary elections in each state, he said.

At these sites, voters are asked 100 questions concerning the specific election in which they are participating, he explained.

Question results are sent back to the shop, then coded, keypunched and tabulated in about three hours.

Eve-of-Election Interviews

At the same sampling spots on the eve of the election, Gallup's field staff of about 1,500 interviewers ask 320 people more in-depth questions about the candidates entered in the primary, he said.

The survey's responses are telephone to and tape-recorded at Gallup's New Jersey headquarters, tabulated that Monday and reported in the syndicated newspapers Tuesday, Oberheim explained.

"It is a top-priority, time-dependent situation which has to run immediately" on the computer system, he said.

Asked whether data transmission of results could be a future possibility, Oberheim called the operation "too complex, with too rapid a turnover of interviewers" and cited the problem of training people to perform the information entry.

In September and October of this year, the organization's army of interviewers will migrate to "key election precincts," to help project a winner for the presidential race, Oberheim noted.

Then, the computer system will use the comparative figures to help predict the final election outcome, but in a limited capacity – analysis through "number chunking," he said.

"But people will analyze the results, he said. "I don't know if a computer ever could analyze the results."

At Daniel Yankelovitch, an IBM-compatible mainframe recently replaced the IBM 1130 the firm had used since 1969.

The Computer Hardware, Inc. Model 2130 CPU is used for most of the political opinion survey and consumer-oriented market research studies.

"We do the straight tabulations of all the jobs run, such as cross-tabulations and analysis of key variables." But the heavy statistical jobs which have to be run are sent to a service bureau with a large machine, Cleak added.

The firm develops question strategies as it goes along, in terms of the present presidential primaries, Cleak said.

At Daniel Yankelovitch, a staff dealing with analysis of results uses pretest to determine questions in future polls, and preliminary tabulations are conducted for each survey's results to determine what the staff will look at in depth, although the computer is only an aide in this respect, Cleak explained.

The DP manager said the company has done about four public opinion surveys concerning the presidential primaries since last December, two of which were published during the Florida and Pennsyl-

(Continued on Page 19)

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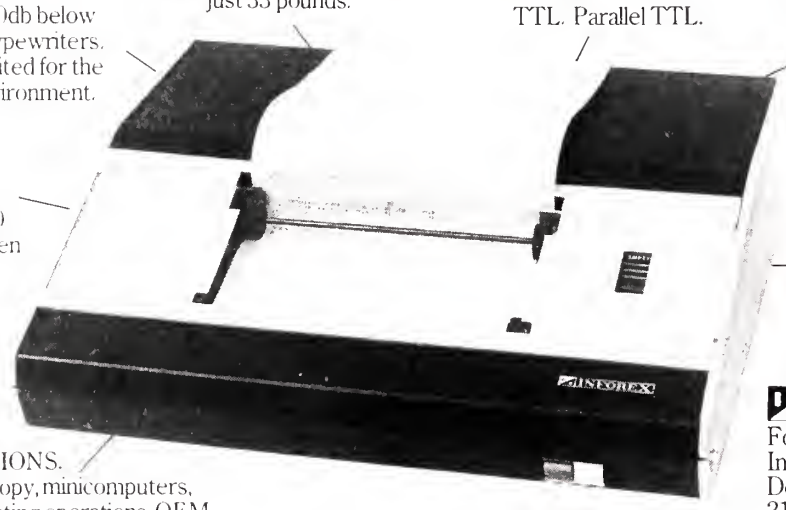

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DP Shares Only Small Portion of Polling Workload

By John P. Hebert
Of the CW Staff

At The Gallup Organization; Louis Harris and Associates, Inc.; and Daniel Yankelovitch, Inc. – organizations which conduct public opinion polling during presidential election years – the computer system is in either a corner of the organization or not there at all.

Spotlight On Election Systems

In a business that is "half art and half science," according to Jim Cleak, DP manager at Daniel Yankelovitch, computers share only a small part of the creative workload.

An IBM 1130 system handles 99% of the cross-tabulations common to analysis of survey results at Gallup, and a Computer Hardware, Inc. Model 2130 running in IBM 1130 emulation accomplishes similar functions at Daniel Yankelovtich.

Harris does not have its own computer – it uses an IBM 370/145 system on a time-sharing basis from its former parent firm, Donaldson, Lufkin and Janrett, David Neft, the firm's chief statistician said.

Looking at Word Processing

Harris is "looking toward" word processing though to handle the typical 400 to 500 pages of printouts received from the service bureau after running survey data through the machine, Neft said.

Using word processing would give the organization "the ability to take raw data and quickly, easily and cheaply transform it into a final form" rather than trying to deal with that large bulk of computer-processed data, he said.

This would involve either owning a system or owning the peripheral gear for such a system, Neft explained, adding the company is watching IBM and waiting for the corporation to build a satisfactory word-processing machine before it makes such a move.

Calling it a major step, Neft noted that the Harris organization might go in-house because the "nature of computers is changing and more capabilities can be obtained for less cost."

"We're certainly not afraid of having computers," he said.

The Gallup Organization also might be in line for a new computer in the future, but the time frame for an upgrade from its present system is not known, according to the organization's founder, George Gallup.

The organization's present computer equipment includes the 8K core IBM 1130, centered in a card-oriented shop, Steve Oberheim, director of systems and operations, noted.

The Gallup shop has additional disk drives, IBM 2315s, each with 512K, 16-bit words, providing 1M bytes of on-line storage, Oberheim said.

In addition, the firm uses two IBM 129 keypunches, three IBM 029 keypunches and an IBM 024 keypunch which Oberheim said was "very old, but very reliable for multiprocessing" – the handling of multiple responses to questions asked by the firm's nationwide network of 1,500 interviewers.

The problem with converting to a new computer system would be software compatibility with new machines, although it would be nice to have one of these machines which are from five to 10 times faster than the 1130, Oberheim said.

Gallup's DP shop also uses a 1442 punch card reader and an 1132 chain printer, he said.

Since Daniel Yankelovitch, Inc. recently upgraded to the Computer Hardware, Inc. Model 2130 CPU, with 16K characters of storage, it does not have any upgrade plans for the immediate future.

The organization uses the 2130 for most of the straight tabulations of survey results, Jim Cleak, DP manager, said.

The heavy statistical analyses are sent out to a service bureau where another batch operation, based on IBM 370/158 and 360/65 mainframes process the data.

"Key-to-disk is maybe where we should be," Cleak said, adding the firm may go to a large in-house system some day.

Behind the Scenes, Pollsters Using DP

(Continued from Page 18)

vania primaries.

"We try to deal more with the issues because this is the real nuts and bolts of market research, measuring the public's mood in relation to the economy and zeroing in on an election later, especially after key primaries," he said.

Yankelovitch conducts a purely batch operation on the Computer Hardware Model 2130, and the organization now has the ability to cross-tabulate surveys with 500-case samples. "There is no limit to the in-house work with the easy stuff," Cleak explained.

For the political opinion polls, the firm uses anywhere from one to six punch cards for each person, depending upon the length of the interview. When the data is fed into the system, the run time can vary from about two hours for a small study to a maximum of 50 or 60 hours. An IBM 1130 system, which was replaced by the Model 2130, would run a maximum of 300 hours on large in-house surveys, Cleak said.

Contrastingly, Harris rarely runs a political opinion survey all at once through the IBM 370/145 computer system it uses on a time-sharing basis – "it's usually too large a job with too many parameters," Neft said.

Like the other pollsters, Harris surveys typically take about two or three hours of machine time, Neft said.

Similarly, the computer system is only indirectly used in the planning of surveys.

Harris uses the computer mainly for cross-tabulation and also factoral analysis of results in a batch processing environment at the service bureau, according to Neft.

The firm does have its own programmers, Neft noted.

Thus far this year, Harris has conducted 10 or 12 doo-to-door election polls.

After a poll is conducted, results are sent off to the service bureau. Some 400 to 500 pages of reports come back and then the company has to decide which of the huge battery of data should be used in a final report. "it has to be read, proofed and then put into the final form," Neft said.

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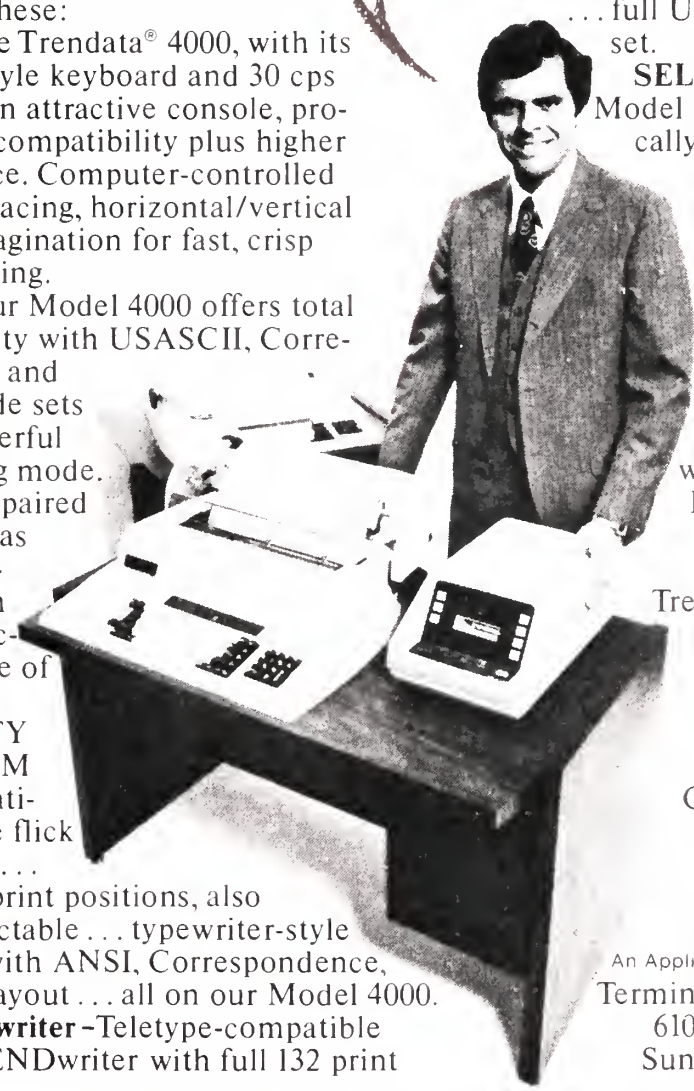

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Suit Charges Congressmen Use 370 to Abuse Franking

By John P. Hebert
Of the CW Staff

WASHINGTON, D.C. – Congressmen have been using a federally maintained computer to prepare mailing lists for their own political gain in election years, according to Common Cause, the citizens' group.

Spotlight on Election Systems

The group is bringing the Postmaster General and the Secretary of the Treasury to court in a suit which alleges taxpayers' dollars are spent to fund the abuse of the franking privilege.

The suit, Common Cause vs. (Benjamin F.) Bailer and (William E.) Simon, asks the Postmaster General to resume more careful oversight of mail sent under the franking privilege to make sure it is official business, according to a Common Cause attorney who is working on the case.

Source of Evidence Only

"The computer is one source of evidence" in the case, the attorney said.

Particular mailing lists contained in the Senate Computer Service's IBM 370/158 mainframe are in question, but the use of the computer is not an issue itself – it is merely an indicator, the attorney remarked.

Figures released by the U.S. Postal Service appear to support the group's case. About $38 million was spent for mail sent under the franking privilege for all 535 members of the House and Senate in fiscal 1975, according to the figures.

In fiscal 1976, a year of general elections, it was estimated $46 million will be spent for all mail sent by congressmen without personal charge under the rubric "Official Business." That is roughly $85,000 for each official.

Common Cause has been gathering evidence since filing the suit in October 1973 and plans to take the case to federal court sometime this summer, the attorney said.

Largest Batch Operation

Compiling mailing lists is "the largest of the batch-processing functions" for Senate members, according to James Estep, supervisor of applications development for the Senate Computer Service.

This batch-processing function is not a prime-shift operation, Estep explained; the real-time programming functions and access of data base files for tracking Senate floor votes and other legislative and administrative functions is "a much larger operation which is run during the prime shift."

The rules governing the use of the computer are set by the Subcommittee for Rules on Computer Services, according to Estep, who has been subpoenaed "along with every [administrative assistant] in the House" and several others.

No Direct Access

There is no direct access by any legislative officer to the computer system; the Senate Computer Service offers senators no data entry capability, but their office staff can make changes to programs, he said.

"Programs and modifications are available to all, but they must get authorization from the sergeant-at-arms to bring in data from the outside" – which would include mailing lists not already in the computer, Estep noted.

Some applications run on the computer are open to everybody; some are open to the Secretary only. The important thing, Estep emphasized, is that usage is determined by particular application rather than by a "blanket" type of coverage.

Terminals in Offices

Terminals are located in member's offices in the Senate Federal Office Buidling and some are within the Capitol Building itself, but these are used for purposes of information retrieval, he said.

The use of the computer service is monitored "as much as possible," Estep said.

Each senator has a mail specialist – a consultant who specializes in the use of mailing lists for franked mail, the Common Cause attorney said.

According to recent pretrial court testimony, one such mail specialist for several Senate Republicans said one of these franking privilege mailing lists was labled simply "Fat Cats."

Other lists hold information on political donors to future campaigns, potential campaign workers and those who have contributed money to candidates for the opposing party, Joyce P. Baker, the former mail specialist, testified.

Point of Suit

According to the Common Cause attorney, the the point of the lawsuit is to stop the practice of using the computer for these illegal mailing lists in general – there is no particular reason other than that.

Common Cause is not asking for specific congressman's accountability on the issue, the attorney said.

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Feared Blacks, Poor Wouldn't Vote

Test of Punch-Card System Denied in Tenn. County

By John P. Hebert
Of the CW Staff

MEMPHIS, Tenn. — The legislative body which approves expenditures for Shelby County here returned a resounding vote of no confidence recently when asked to fund the test of a computerized election system in the state's May 25 presidential primary.

Spotlight On Election Systems

The request was made by the Shelby County Election Commission Board, which wanted to test the Computer Election Systems, Inc. (CES) Votomatic punch-card voting system in 30 precincts out of the county's 218. The Shelby County Court unanimously turned down the request.

The county court — a quarterly court usually composed of 11 members, but presently composed of 10 — said "no" because it thought the poor and blacks would be disenfranchised due to a fear of the computerized system, according to Ann Weldon, chairwoman of the county's Election Commission Board.

The four black members on the county court were "sold a bill of goods" by the court's white members, Weldon said.

The court based its decision upon an unwillingness to try the CES equipment, she added, noting the court never saw the system.

Aimed at Saving Money

"What we were trying to do, basically, was to save money," Weldon said, but those who must approve the expenditure to test the machines are the "people who don't know about it.

"Everybody [else] we've shown it to thinks it's the easiest thing they've ever seen," she added.

The budget for the elections process in Shelby County each year is over $1 million, a figure which Weldon termed "ridiculous." This year, those costs may rise another 45.3% — a result of "the biggest elections the county has had" and the resulting involvement of personnel to run the elections and storage of the present lever-type machines, she said.

It costs the county about $40,000/year or about $1/ft — to store the Shupe Co. lever-type machines and will cost another $20,000 for plastic covers this year, Weldon said.

These facts, when combined with the high costs associated with transporting and setting up the 800-lb machines, should have been enough proof to persuade the county court to approve a test of the Votomatics, Weldon indicated.

About 25 Votomatic machines can be stored in the space required by one lever-type device, she noted.

Resistance of Blacks

The reason why the county court voted against the use of the Votomatics in the presidential primary elections, according to Charles Perkins, chairman and member of the Shelby County Court, was because of a "resistance among the black squires" — members of the court.

The blacks think the black community will not accept the computerized system because of many things, he said.

Among these are a feeling that it is an untried system and the security is not as good as with the lever-type machines; that using the punch-card system carries the danger of cards being able to be repunched after the voter has cast a ballot; and the fact that the CES system is "not really sturdy looking — it's really fragile," the court chairman said.

As a result of the vote by the county court, the test of the CES machines has been deferred indefinitely, he said.

The Shelby County Election Commission Board had "no authority to hold such a test" in the primary, he said. "I'm still not sure if the law allows such a test," Perkins, who is an attorney, said.

Weldon, however, said the court is "so busy talking [it] won't look at the system or try it.

"They say, 'We're not ready at this time, but we might be in two or three years. We want to defer.' But there's no time length given for the deferment."

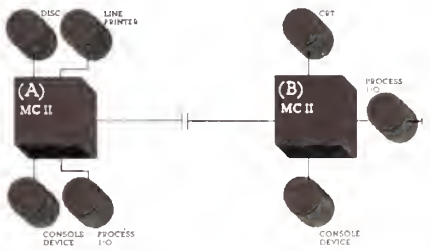
Some of the components of the Shupe Co. machine might be manufactured in Tennessee, Weldon thought, but she declined comment on whether this was a factor in the court's decision.

The county election board is going to appeal the ruling to the state election commission to try to have the test in county elections in August, Weldon said.

Case History No. 1
A giant aluminum company chose MODCOMP for this simple two-computer "network."
Computer A is at one of the Company's plants in Pennsylvania. Computer B at a research facility in Tennessee, several hundred miles away. The two computers communicate with each other over ordinary dial-up telephone lines. Using MAXNET, operators at either location have full access to all the resources of both computers. Data, programs, peripheral services can be freely exchanged.

For example, suppose a research engineer at Computer B needs to compile a new program. By a simple terminal request, he can call down language processors from Computer A, compile and edit his program on his own computer, and transmit his listing outputs back to Computer A for printing.

Alternatively, a programmer at Computer A can prepare a program and load it directly down to Computer B. Even though it's the break of day in Tennessee, and the computer is all alone in the office.



This relatively simple system illustrates the flexibility of MAXNET, whether the computers in your network are in adjoining rooms, or a thousand miles apart. It would work just as well if they were on different planets, but nobody's asked us to do that. Yet.

Case History No. 2
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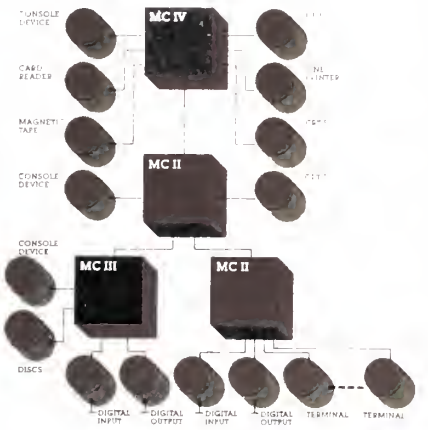

As the system has since evolved a 32-bit MODCOMP IV now acts as host computer. Replacing (at a fraction of the cost) the company's former stand alone IBM 1800, the MODCOMP IV is expected to provide 10 to 25 times the throughput of the big machine, which had long since reached its saturation point.

A MODCOMP II acts as communications controller between the host and satellite computers.

The satellites consist of 16-bit MODCOMP II's performing various data acquisition and control functions for a series of pilot plants. The MODCOMP III handles analytical instrumentation, providing simultaneous service to over 80 instruments of various types.

The advantages of this system are, firstly, it's computing power—many times that of the old stand-alone system. It's reliability (the MODCOMP system has had an overall availability of 99.3% of prime time over the past two years). It's expandability, which allows virtually unlimited future growth. And last, but far from least, it's economy and ease of operation.

Case History No. 3
A NASA prime contractor has installed this highly sophisticated MODCOMP hierarchical network to handle complex stress and fatigue test analyses.

Dual redundant 32-bit MODCOMP IV's at the "host" level communicate with an intermediate level of several smaller 32-bit MODCOMP IV's, screening data received from the satellite computers. A large number of 16-bit MODCOMP II satellites interface directly to the various processes. The entire system has built-in redundancy at each level.

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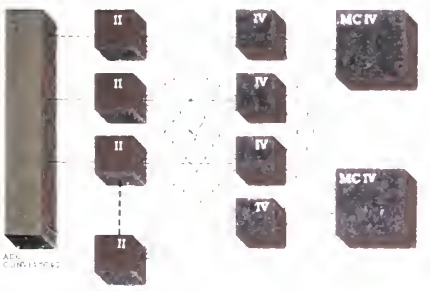

For clarity, peripheral devices omitted from this diagram.

Note: The MAXNET systems shown here are all resource-sharing networks of the type commonly used in laboratory and industrial measurement and control systems. For dedicated telecommunications applications, MODCOMP offers a separate software system called MAXCOM. For more information, send for our Data Communications brochure.

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Mini Helps Party Comply With Spending Report Rules

By Esther Surden
Of the CW Staff

WASHINGTON, D.C. – The Republican National Committee is using a minicomputer system to cope with the complex election spending reporting requirements imposed by the Federal Election Commission, according to Richard Thatcher, director of accounting and deputy treasurer for the committee.

A Microdata Corp. Reality system was purchased to replace a Burroughs Corp. L 5000 magnetic stripe electrocard system which wasn't powerful enough for the committee's needs, he said. A minicomputer was a necessity because of the need for immediate on-line access to data and for security purposes, Thatcher said.

The committee also considered Burroughs, Digital Equipment Corp. and IBM systems. The Microdata system was chosen because of its use of data base management techniques, on-line capabilities and use of Microdata's English languge.

Spotlight On Election Systems

The English was important because many of the members of the committee who might be accessing the data are not computer experts and needed a simple language, he said.

The system includes a Microdata 1600 central processor with 32K of core, a 10M-byte disk drive, four CRTs, a 300 line/min printer and a dial-up communications line that will allow communications between the committee and various affiliated committee members when operational. Additional ports are available for RS-232-type devices, he said.

The system cost $75,000 from Datatel, Inc., a Microdata dealer, Thatcher added.

Software for the system was designed by N.L.T. Computer Service in Nashville, Tenn. The software house was familiar with political work and so was considered the best to do the software job, Thatcher said. The firm developed the application packages specifically for the committee in three months, he added.

Applications on the system include accounting, some word processing, label making and the keeping of a data base of political information. Two CRTs are kept in the accounting office, and some will be located in the executive director's office, the political director's office and the operations center that coordinates political activities.

"Eventually, a CRT may even be located in the White House," Thatcher said.

The kind of information being kept on the elections includes the location of congressional divisions up for grabs, the names of the Republicans running, their opponents' names and a 1-to-10 rating system on whether the seat has been traditionally Republican, is shaky or has been occupied by another party traditionally, Thatcher said.

The names of campaign managers and key people to contact for each division or senatorial seat will also be kept in the system.

This data base is subject to change, Thatcher added. For example, if the chairman wanted to know something that isn't included, the data element can be added to each record of the file. This assumes good data base preparation, Thatcher explained.

'Information being kept on the elections includes the location of congressional divisions up for grabs, the names of the Republicans running, their opponents' names and a 1-to-10 rating system on whether the seat has been traditionally Republican, is shaky or has been occupied by another party traditionally.'

The system is too small to handle polling or voter opinion work, he added.

The system will also be able to let the committee know if spending limits for a particular race are being exceeded. This is very important because of new federal regulations, Thatcher said.

"Since I sign the reports, I have a double interest," he said.

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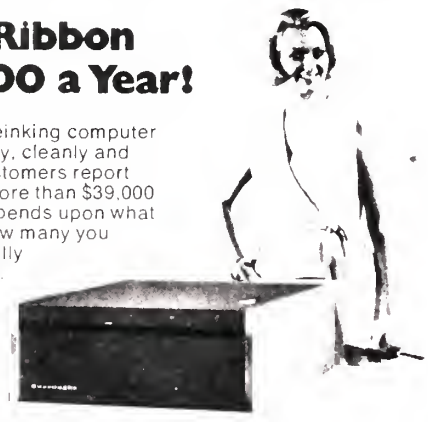

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Mass. Firm Starts With Questionnaire

DP Helps Pollster Tailor Client Candidates' Campaigns

By Nancy French
Of the CW Staff

CAMBRIDGE, Mass. – Political candidates used to win elections by appealing to the ethnic, religious and educational orientation of their constituents.

But today's voters, who abandoned their parents' political ideas as casually as they left their old neighborhoods, are more difficult to categorize, political scientists have discovered.

Spotlight On Election Systems

Candidates who can afford it have therefore come to rely on computer-assisted public opinion polling firms to learn who their constituents are and what they think.

One such polling organization is Pat Cadell's Cambridge Survey Research, Inc.

A company whose first big job was researching Sen. George McGovern's campaign for President in 1972, the Cambridge group now boasts a client roster studded with the names of Democratic Presidential contender Jimmy Carter, Maine Sen. Edmund Muskie, Del. Sen Joe Biden, Iowa Sen. Dick Clark, R.I. Sen. Claiborn Pell and Colo. Sen. Floyd Haskell, for example.

Its service is "expensive" – usually only senators, governors and presidential candidates can afford it, according to senior analyst Dottie Lynch.

10% of Campaign Funds

Wealthy or not, those candidates have learned it makes sense to spend 10% of their campaign funds on research before investing in costly media campaigns and printed literature.

The objective of the researcher is to find out how voters feel about the client candidate, his opponents and the issues involved in the campaign. With this information in mind, a candidate can plan a strategy that emphasizes his strengths and deemphasizes his weaknesses, according to Lynch.

Secondly, the researcher must determine which types of voters strongly favor which candidate and which voters are undecided or "soft."

Little can be done to influence those with strong convictions, Lynch explained, so the undecided voters – especially those who seem to lean slightly toward the client candidate – are the voters the candidate concentrates on.

Thus a candidate with limited resources – and all candidates' resources are limited – can determine how much should be spent on TV commercials on which stations and how much should be allocated for newspaper ads and which newspapers should carry them.

The Cambridge group obtains this information from a 200-question voter questionnaire and a thorough computer analysis of the results.

The 200 questions are posed in face-to-face interviews rather than by telephone, Lynch said. Interviewees are selected statistically by neighborhood in each community polled, and an effort is made to get an equal number of men and women.

Sometimes a sample of the original interviewees are "paneled back," or telephoned in, at key points during the campaign to measure changes in voter attitudes.

A typical questionnaire includes a series of "agree/disagree" statements to determine how voters feel about subjects such as the economy, national defense and foreign affairs.

The questionnaire also contains a series of questions that provide an objective view of the candidate's image and reputation, she said.

Another series of questions gives researchers an idea of how they can reach selected voters through the media. Candidates are asked what newspapers and TV news programs they see and believe.

Once the questionnaires are completed, the answers are coded, keypunched and analyzed by computer.

The computer doesn't add any special dimension to the task – it just lets pollsters do a lot faster what would otherwise be done by hand, she said.

In most cases, turnaround time for a report, which includes everything from formulating the questions to conducting interviews, analyzing the results and writing the report, is about one month.

Survey data is reduced to manageable terms using a standard Simulation Program for the Social Sciences (SPSS) package from the National Opinion Research Center, according to Dean Smith, computer programmer.

Written in Fortran and Assembler, SPSS furnishes all necessary functions, including frequency counts, cross-tabulation tables, factor analysis and regression analysis, Smith said.

Once the computer prints out the results, the group writes what is usually about a 200-page report analyzing the questions, identifying the "soft" voters.

Samples Sometimes Wrong

It is not uncommon for a sample to turn out to be incorrect, Smith indicated. For example, "when results are in we often find the number of females interviewed outnumber the number of males. If this happens, the results are weighted to make the sexes numerically proportional."

When relationships are found, sometimes several categories are combined, Lynch said. For example, the alienation scale might be combined with other questions such as demographics to develop a composite score, she explained.

Many of the candidates are pretty surprised to see the results of these surveys, she indicated.

Joseph Timilty, a Massachusetts state senator who was defeated by a narrow margin in his race for Boston mayor against incumbent Kevin White, was shocked to find he was not known in the upper middle class liberal Back Bay and Beacon Hill areas of the city even though he had been active in Boston politics for eight years.

The survey found many potential Timilty voters in these areas – voters who were unhappy with Mayor Kevin White's performance.

The survey also found voters in these two areas were highly interested in two issues not usually associated with upper middle class liberal voters – crime and problems of the elderly.

Going by the traditional patterns, Timilty would have emphasized crime only in black and ethnic neighborhoods and problems of the elderly in neighborhoods with a larger proportion of elderly residents, Lynch explained.

Lynch refused to discuss the work now being done for Carter, but offered examples from the McGovern race.

In June 1972, she said, the Cambridge research group interviewed 13,000 voters nationwide using local interviewers.

The information was analyzed and a report was written. Then, in September, 1,300 of those voters were "paneled back" by telephone to measure the impact of Thomas E. Eagleton's resignation as McGovern's running mate.

The polls revealed even then just how bad things were, she said.

Although Nixon was not well liked among the voters, McGovern's problem was worse: people simply didn't believe he was competent, Lynch recalled.

The election results were no surprise, she said.

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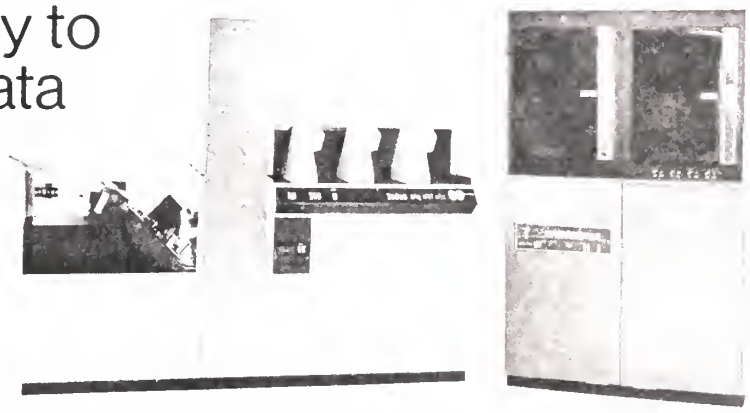

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Editorial

User Voice Needed

A giant battle is shaping up in Washington, D.C., that may determine how users of data communications will have to operate in the future and – once again – the user is almost the only one who will have no organized voice in the matter.

AT&T has hauled out heavy artillery for the battle by urging its millions of shareholders to present their views on the proposed Consumer Communications Reform Act to the Congress.

And the firm is apparently sparing no expense or manpower in the effort to make its position supporting the act clear to the legislators of Capitol Hill [CW, May 24].

On the other side of the battle lines are the specialized common carriers and interconnect equipment manufacturers – and they're not ready to let AT&T take the Capitol by default.

These manufacturers have banded together in the Ad Hoc Committee for Competitive Telecommunications and will give Bell a run for its money in the hallways and cloakrooms of the Capitol – even if they may seem outgunned and outmanned by the sheer size of AT&T.

This group will also have an ally in the Computer Industry Association, which has already begun speaking out against the concepts embodied in the Bell-sponsored legislation, and other vendor organizations such as the Independent Data Communications Manufacturers Association.

It promises to be a battle royal, but no one is representing *you* – the user – and *you* will have to pay the piper one way or the other.

There is no strong user organization in existence that will take a stand on these issues, not one group that can be depended upon to make the users' views known to the Congress; yet the users will be the ones most affected by any legislation that is either passed or defeated.

Computer users have for years banded together in solely professional organizations – the Association for Computing Machinery, the Data Processing Management Association and so forth.

All of these organizations are established as educational and professional societies, and under the U.S. tax code they are barred from any activity that smacks of lobbying; even activities that only remotely could be called lobbying scare them off because they cannot afford to lose that cherished tax status.

There is no easy solution to this problem. For too many years, DP people have seen themselves as disinterested professionals and have refused to band together into any strong group representing users.

Now – once again – users are reaping the crop of years of indifference. Once again, a major battle will rage around DPers who will not take sides. If they lose, it will be largely their fault since they refused to become involved.

About all an interested user can do now is to study the proposed legislation and write directly to the local congressman expressing his views on it.

But such an effort will hardly have the effect that the lobbying by the two professional sides in the argument will have.

Users should write, make themselves known, but they also need to do a lot of hoping and praying that the results will not be too unfavorable for them.

They also might learn a lesson and decide it's time to get an organization that can represent their interests in future battles of this type.

'How Come I Never Get Any of the Interesting Stuff?'

Letters to the Editor

Display, Report Design at Fault In Error Causing Inmate Suicide

The article about the Yonkers, N.Y., police communications employee who was blamed for the suicide of a jail inmate [CW, May 17] typified the "communication" gap between the programmer/analyst and the user.

Too many times I've seen the garbage foisted off on the user in the form of cluttered and unintelligible CRT screens or superabbreviated reports full of unedited digits.

There doesn't appear to be any good purpose served by taking disciplinary action against the CRT operator when the error was a result of inadequate training of the operator by the police department, compounded by a vague and misleading code.

Furthermore, the inmate died at his own hands and not at the hands of the operator.

Nevertheless, it is my personal opinion that some people who are responsible for the design of displays and reports ought to spend more time in the user's shoes and consider such things as ease of operator training and report interpretation long after the designer has left the scene.

Marvin Cruzan

Kansas City, Mo.

Article Out of Place in CW

In reference to the article in the May 17 issue, I found it very hard to believe that anybody in his right mind would take his life because of a misinterpretation of a parole violation.

This article belonged in *The Enquirer* rather than in *Computerworld*.

John F. Luke

Cloquet, Minn.

What Happened to March?

Monty Goolsby's letter [CW, May 17] indicated that on Feb. 28, 2100 at midnight the calendar will change to April 1.

I cannot help but wonder what will happen to the month of March for that year. I do not think I will try to program for this change.

Robert L. Tipton

Emporia, Kan.

Our fault. It should have read March 1. Ed.

Hardware May Replace 'Orgware'

I noted with interest a letter in the May 17 issue from Gerald M. Weinberg in which the term "peopleware" was deplored.

I suggest the most serious objection to this term is that it contains one syllable too many (vide: hard-ware, firm-ware, peo-ple-ware). This fault can be remedied by substituting the word: "orgware."

"Orgware" is that part of the data processing environment which is implemented in organic substances (keypunchers, programmers, analysts, etc.).

The most significant observed differences between orgware and other components of a DP establishment are:

- Orgware components have a shorter mean time between failures than other components.
- Orgware components are subject to less conscientious maintenance and more infrequent upgrades than other components.

I believe major development efforts are under way in the computer manufacturing industry to replace expensive, unreliable orgware with cheap, reliable hardware and firmware.

Bradford McCormick

Baltimore, Md.

(Other letters are on Pages 26, 36 and 37.)

Data Past

Five Years Ago
June 9, 1971

PHOENIX – Motor Replacement Corp. (MRC) dropped a $5 billion class-action suit against IBM challenging the industry leader's unbundling practices. No other users had come forth to join the legal action.

– – –

MIAMI – Eastern Air Lines (EAL) tried to win a cash tax rebate by proving in court IBM's preunbundling software and support were actually worth 55% of the catalog price of its system.

Eight Years Ago
June 5, 1968

LOS ANGELES – Western Union (WU) and Computer Sciences Corp. (CSC) neared final negotiations on a proposed merger that would, in effect, put CSC on-line with the entire country, as WU had made known its intention to become a nationwide information utility network. University Computing Co. (UCC) also in the running for a merger with WU, withdrew its $44 per share offer for WU stock. Industry sources viewed the action by CSC as simply a move to halt negotiations between UCC and WU.

– – –

HANOVER, N.H. – An order placed by Time-Share Corp. here with Hewlett-Packard Co. (HP) marked the entry both of HP into the time-sharing computer vendor business and of Time-Share into the time-sharing service market. Five HP 2000A computers, with some modifications, were delivered to the computer time vendor.

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PLEASED	FURIOUS
INVOLVED	INFORMED
AWARE	SURPRISED

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Detach here, fold, and place in post-paid envelope attached through binding.

Distributed Intelligence

I haven't done as many Computer Caravans this year as usual, due to my new California address and to a narrower relationship with CW activities. But at the three where I did help (Chicago, Los Angeles, and San Francisco) I had fun doing the minicomputer workshops, as well as reading the Annual Message, an editorial estimate of major trends, especially as affecting workshop tactics.

Part of the fun lay in skirting carefully the Scylla of false enthusiasm – "Grosch's Law is dead: long live the mini!" – and the Charybdis of excessive dourness – "What was good enough for your granddad and me is good enough for you!" And in addition, the special area of distributed intelligence, or more precisely, distributed data and distributed control, is the favorite parade ground of my favorite Naval Person, Grace Hopper. So the trick is to tread lightly, smile wryly, and hope the audience senses my doubts.

How pleasant, then, to read in my own paper [CW, May 3] a nice, clear statement from the top computer man in Honeywell, Clancy Spangle, that I can quote fondly for the next year or so. "It will be five years or more before distributed systems become a substantial part of the data processing mainstream," he said. Hear, hear, Clancy!

He referred at length to problems of hardware and communications economics, to severe organizational hazards – human organization, that is – and of course to the overwhelming difficulty of software, especially control software. Quote after quote was accurate, farsighted and, especially from such a senior boss, authoritative.

I'd like to direct a little extra attention to the dimensions of the control problem. Clancy doesn't emphasize it as much as he does the centralization/decentralization sort of thing; I think it's overwhelmingly the most important factor. Consider the situation in a really fancy scheme: you have portions of each class of data stored in various computers ("nodes"), you have each applications program stored at a limited number of nodes, you have indices of data location and program location stored – well, stored *somewhere*. If you put all the indices in one place, that node is more important, more central than the others: the beginning of a hierarchy. If you distribute completely, you must have pointers at every node, entry programs at every node, steering you into the indices and then on, via end-of-line linkages, to further control.

Remember, the nodes will most certainly *not* be identical. At the very least, they will have different memory capabilities; more often, different memory tapes, different peripherals, even different CPUs. Thus either the major control overlays, wherever they are, must keep count of the characteristics of each and every node, or, horrible thought, there must be a virtual network on top of the real one, automatically shuffling packets of data and code around as nodes fill up their memories or run out of CPU power.

And where will you put *that*, my ambitious friends? The problem is in a very real sense recursive: to spread the system over many nodes takes an elaborate control, which soon grows too large and itself must be distributed: its activation in turn calls for higher control, and so on up into the stratosphere. No doubt the software can be made to, ah, converge: no doubt a very closely written top-control can be small enough to duplicate at every node or every port of the system. But it won't be easy!

And in what elegant and abstract language will all this be done? I'd suppose one of the more powerful list processing languages, a later version of what Fred Thompson passed on to me at DEACON and later reconstructed at Cal Tech. But the compilers and debug routines of latter-day LISPs are also very large (and slow) by minicomputer memory (and CPU) cost standards.

My own guess is that for many more than Clancy's five years, every very ambitious or academic (that is, throughput-insensitive) network will be semicentralized: somewhere there will be a Big Node, a veritable bunion of a node, where the list-processor and the indices and most of the system control will reside. Entry at all other nodes will be routed first to that special node, and from there flow out to where the data and the applications programs are, and back – probably via the chief node again – to the point of entry or a more powerful "adjacent" point.

That, we might do in five years – not, I'd guess, much sooner. We don't do anything that powerful on ARPANET: the control overlay is almost entirely human, and in documentation rather than on disk. And dozens of languages vie for eminence up and down the data communication links, to the greater glory of the profession, the greater confusion of the sponsor, and the greater impoverishment of the taxpayer.

I look two ways. On the one hand, if I yearned for a practical mini net, to do real work for budgeted dollars, I'd make the nodes compatible and preferably identical, even at the cost of some wasted hardware at less vigorously-used nodes. I'd permit one, or in a very large net, a small number of supernodes. And I'd do top control from a looseleaf notebook at the super-node(s).

But if I wanted to build a genuine intellectual monument – and it would be, I mean it – I'd forget about hardware and list-processor characteristics and data communications protocols, and even applications. I'd go off to a monastery in Los Gatos or Novosibirsk and draw plans on Klein-bottle-shaped blackboards with hexadecimal chalk for a few years. Grace is right: it *can* be done. Distributed "intelligence" can come. But it will be difficult as Apollo – and in the long run, perhaps no more rewarding?

Herb Grosch

Random Decisions Result of Ignoring Default Problem

The default characteristic of an operating system has long been known as a most important item. In fact, the development of better and better software over the past 20 years can be remarkably paralleled by the development of systematic hardware and software defaults and our understanding of default systems.

The Taylor Report
By
Alan Taylor, CDP

However, defaults are not an obvious study. Few systems, as they are developed, contain more than spotty cases of defaults being provided, and hardly any have a developed and considered default system. The results in many cases are loopholes, inconsistencies and random decisions being made and explained in odd ways.

As a homely example, consider the legal system put forward as a result of the various credit agency abuses. A legal system is not a computer, but many of the same rules apply to any system.

What happened was that Jordan Marsh, a local department store, approached my wife while shipping, asking for her to fill in a credit application form, so that she could get advance information about sales and other items. She did, gave the form back and a week later got a Form RFD Rev. 2 letter refusing the application. This response gave two underlying reasons: that TRW Credit Data was apparently 'unable' to supply any information on her and that Jordan Marsh had been 'unable to verify income.'

In accordnance with the various legal rules, additional information was given, such as the address of the local Federal Trade Commission (FTC) office that handles discrimination against credit applicants and the fact that if an insufficient or unwelcome 'consumer credit report' was the basis, then copies of this were available free from the agency.

In this case, where no credit report was obtained, this latter didn't apply.

Legal System Default

That brings up the first system default problem. If a person has no record, does that give him less standing than someone who has a bad record?

The question of what to do when there is no record supplied (which is all that Jordan Marsh can know happened, despite the claim that TRW was "unable to verify income") is a first-level default. It is an important one so far as the intent of the law regarding the use of credit reports was concerned.

If the absence of such a report is usable as a reason for declining credit, all that is needed to evade the intent of the law is for TRW local offices to throw away any records they have on a person. This would, blamelessly, let the original abuses continue!

Clearly, if it had been anticipated that credit could be refused based upon an uncontrolled absence of a report, the law would have specified that in such a case the consumer would have the right to supply a report, in the same way that he has the right to supply a correction.

So here is a default characteristic that has apparently gone wrong. And putting it right may well take years – just like the errors to computer system defaults.

The second reasons Jordan Marsh gave was, interestingly enough, also a default reason. An inability to verify income, which Jordan Marsh claimed was its only other reason to decline the application, is a quickly curable item. Such an inability is perhaps something which could properly authorize the application to be held until some income verification was obtained, but Jordan's letter didn't suggest such a possibility.

In fact, it didn't even say how Jordan's attempted to verify income, which of course is a prerequisite to being correctly "unable" to verify something.

Did the banks refuse to say what income was involved in her accounts? I don't know – but I do know that Jordan's didn't ask her employer to supply the information. So I just don't buy either the investigation or the absoluteness of the rejection for a reason that is

(Continued on Page 38)

Dear Customer

Thank you for your recent application for credit privileges. We regret that we must decline your application at this time.

In making our determination whether to open an account, we must consider factors related to the employment, income, residence and other obligations, of the applicant. We must also be mindful of the legal remedies available to us in the event of non-payment. In view of our own experience, and the experiences of the credit industry in general, these factors provide us with a reasonably accurate indication as to whether the opening of the account would be in the best interests of the applicant and Jordan Marsh.

We have checked below the specific reason(s) underlying our decision at this time.

☐ 1. Information contained in a consumer credit report obtained from _____

☐ 2. A consumer credit report containing insufficient information for our needs, obtained from _____

☒ 3. The consumer reporting agency contacted was unable to supply any information on you. That agency was TRW Credit Data, 15 Howard St., Framingham, Mass. 01701

☐ 4. Insufficient ( ) length of, or ( ) stability of employment

☐ 5. Insufficient ( ) length of receipt of, or ( ) stability of income, or ( ) amount of income

☒ 11. Other (specify) Unable to verify income.

If either of the first two boxes is checked, you have the right to a full disclosure of the nature and substance of all information on you (except medical) in the agency's files, at no charge to you.

The Federal Equal Credit Opportunity Act prohibits creditors from discriminating against credit applicants on the basis of sex or marital status. The Federal agency which administers compliance with this law concerning this creditor is the Federal Trade Commission, 150 Causeway Street, Boston, Massachusetts 02114.

Very truly yours,
JORDAN MARSH
Credit Department

The letter shown above uses default decisions to arrive at a conclusion. Reviews of these types of homely decisions can be the basis for improving automated decision-making applications on computers.

Letters to the Editor

No Need for Dump Debugging If Right Language Used

I read with interest the position taken by B.H. Boar concerning the use of dumps to debug programs [CW, April 26].

I was somewhat amazed that shops can continue to use the antiquated dump as a tool to accomplish everyday debugging, and I was reminded that, regardless of how far we have come there continues to exist a communication gap of enormous proportions between the users and designers of the various languages in use today.

Surprising as it may seem, there is no real need for dumps if a shop uses a language that is designed not just for the executing system, but also for the programmer. If one examines any trade publication, almost without exception, one will see that emphasis is placed these days on programmer efficiency, not simply machine efficiency.

It has been possible since the early IBM 360 days to give programmers tools that can eliminate the need for most dumps. The only thing lacking is the desire to do so and the conviction that if the user is not apathetic to the vendor and/or the language, a change can be forced.

When a programmer experiences a data exception, there is no need to get a dump. The language can support, at a reasonable cost, the facility to tell the programmer in his terms exactly what has gone awry. It can tell him what procedure has the error, what statement is in error and even which field is in error and it can do so in batch, remote job entry or interactive environments.

To carry a good thing even further, the day is rapidly approaching where the hardware will be able to accomplish this feat, not just the language.

The core dump in many shops is a relic, confined only to those problems that are highly complex, totally transient and real bears! Perhaps if those individuals like Boar really dislike core dumps, they should look toward other languages with which dumps are mostly a thing of the past, and the best one I know of is PL/I.

Lee Milligan
Bloomington, Ill.

Women No Minority

In re the letter of Valerie Van Holten et al [CW, May 17].

Since I had read the April 25 issue and not noted anything complaint-worthy — however subtle — I reviewed it.

The Raytheon Data Systems advertisement on Page 30 and the Optical Business Machines, Inc. advertisement on Page 25, in my eyes, were the ads Valerie Van Holten et al should have complained about [CW, May 17].

If advertisements with only men in them offended them, they missed many others.

Females as uptight as these do their cause a disservice. Men like myself who cheer the Janet Guthries are disappointed.

One thing I am absolutely positive about is that women are no minority.

William Boyla
Detroit, Mich.

A Problem With Titles

After 17 years in data processing, I must ask Valerie Van Holten et al who, in the May 17 issue, protested the "blatant and subtle discrimination practices of the computer industry," the simple question: What in the hell is an "acting head," and what in the same place is a "computer specialist?"

Could it be something like a systems analyst who never learned to program or female programmers, who insist that their male colleagues move the heavy forms boxes around for them?

Finally, how can something be subtle and blatant at the same time?

Frank K. Binder
Cambridge, Mass.

Wonder Woman at Her Finest

In all fairness, how can the blur in the background of the Northrup Data System ad on Page 47 of the April 26 issue be designated a "male" computer person and draw the ire of our female counterparts [CW, May 17]?

To me, it looked like Wonder Woman at her finest.

C. Daniel Moore
Marietta, Ga.

A Marker Suggestion

As the marker for the articles on the importance of proper selection, training and motivation of the people who select and use computer hardware and software [CW, May 17], why not simply use "The Human Connections"?

Jacquelyn (Haki) Evans
San Franscico, Calif.

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INNOVATIONS FROM

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The price is within the affordable range of $110,000 to $300,000* and the HP-3000 Series II has the standards of performance, reliability, and quality inherent in the Hewlett-Packard name. If you plan to install a computer or upgrade your present system, you owe it to yourself to get all the facts. Read on▶

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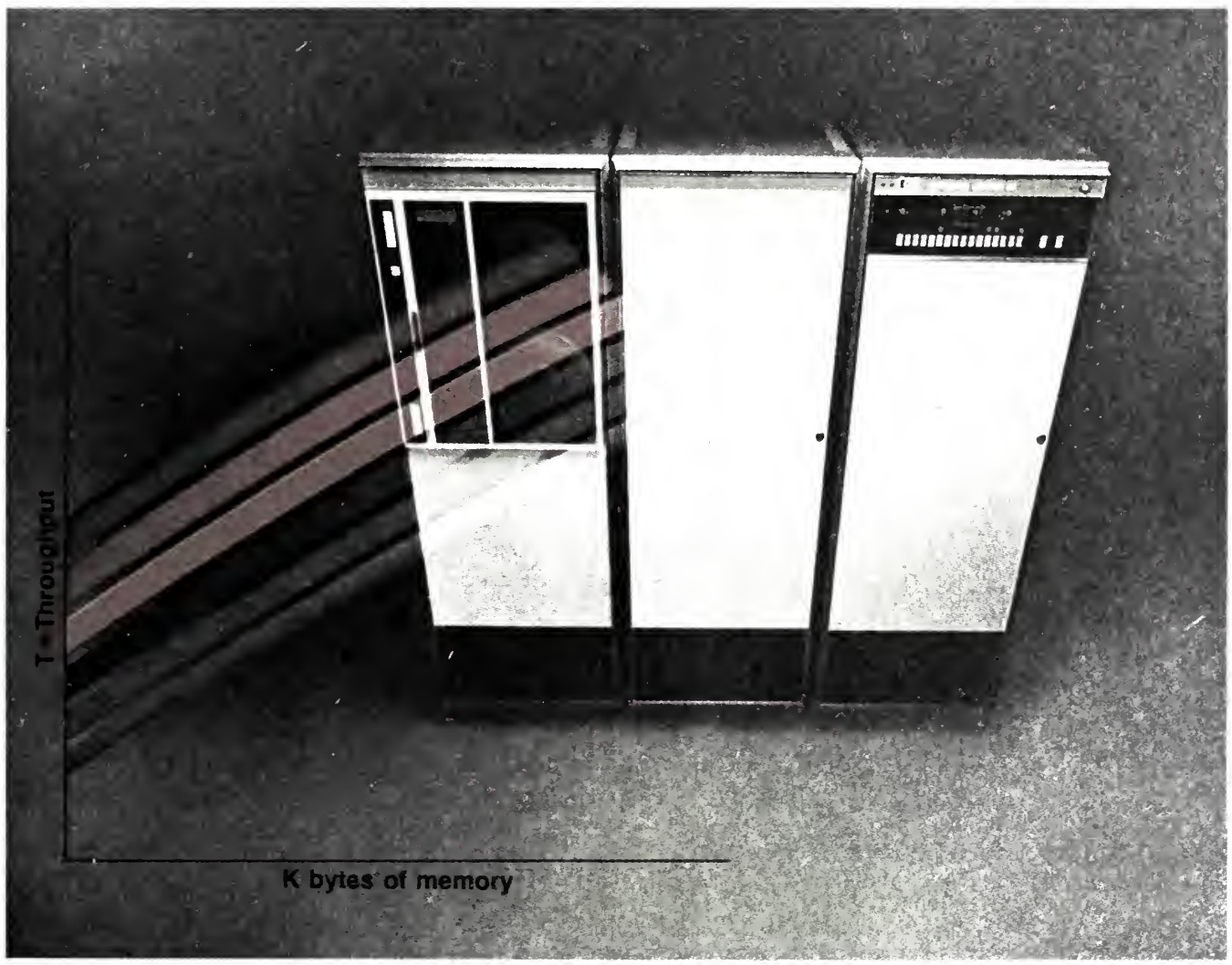
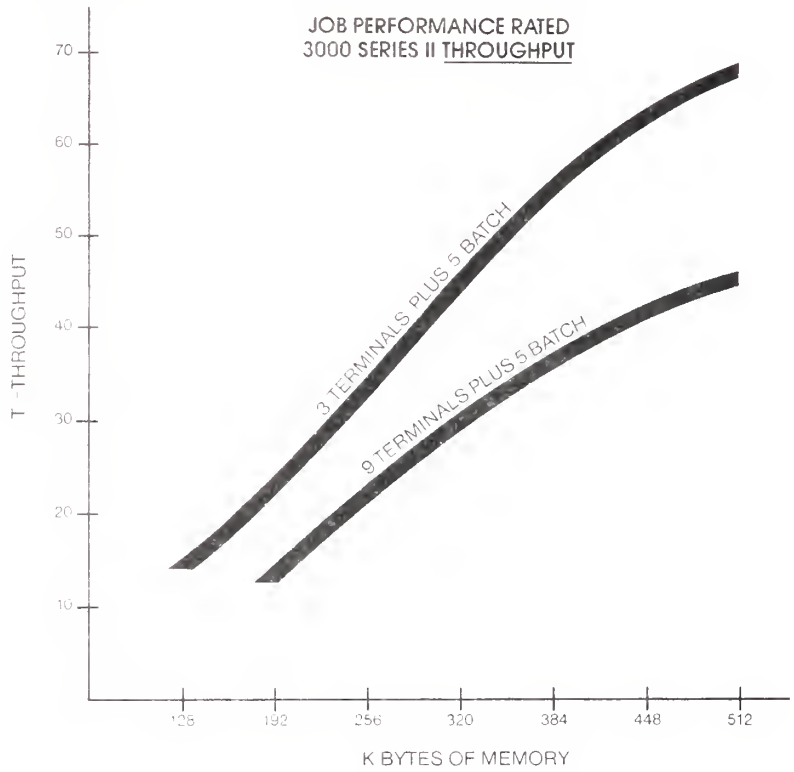


HEWLETT-PACKARD ANNOUNCES THE HP-3000 SERIES II



HEWLETT-PACKARD SERIES II IS JOB PERFORMANCE RATED

BUSINESS DP MIX	
3 & 9 INTERACTIVE USERS	5 BATCH USERS
• COBOL program development of 3359 lines of code at .3 Char/Sec. rate repeatedly	• 85 statement RPG compile and execute 2 key SORT on 17 records, 292 statement RPG compile, execute and print 750 line report. • Disc to disc copy of 3359 source records. • SORT 80byte, 10,000 record file on 3 keys. • COBOL compile of 3359 statement program. • IMAGE data base management program in 700 statement COBOL program updating and deleting in random order each record of a 500 record data base.

Evaluating a multi-programming interactive computer system is perplexing. Available benchmarks for stand alone, sequential batch machines do not apply to an on-line multi-programming system. This causes a real problem.

The design of the HP3000 Series II brought with it an opportunity to address that problem. To simplify a prospect's task of evaluation, the HP3000 Series II performance has been measured. Both the throughput and response times for Series II Systems have been quantified. The Series II is "job performance rated."

A test performance simulator helped the Series II design engineers optimize system parameters. From these simulations evolved the idea to job performance rate the HP3000 Series II for both terminal response time and system throughput.

Accurate measurements of the response time of the Series II were obtained from a hardware simulator driven by an HP2100 mini-computer. Together with special software, it has the ability to simulate any number and variety of interactive user inputs to the Series II, to measure the amount of time for a response to a terminal and then to log the data. To closely approximate the real world, the simulation was designed to include user typing time, and to statistically generate random "think" time.

Next, job mixes were defined typical of Series II data processing, scientific, and timesharing environments. The scientific mix used an assortment of FORTRAN and BASIC programs run in both batch and interactive mode. The data processing mix utilized a variety of RPG and COBOL programs and compilations, file sorts and data base manipulations.

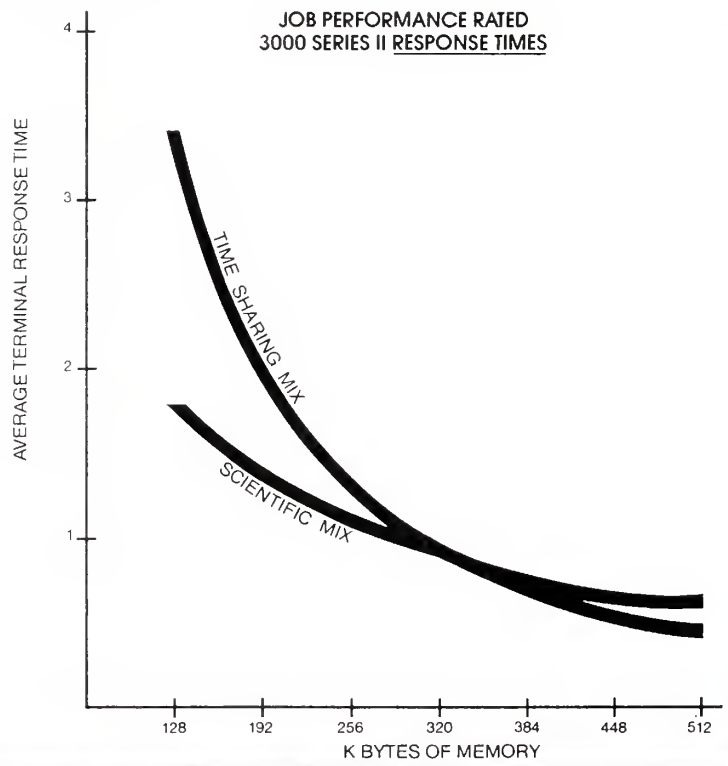
Then, each job mix was actually run on standard non-optimized Series II Models of varying memory sizes. Each job mix was run first for one hour with the addition of three interactive users, and then for another hour with nine interactive users. At the end of each hour, batch job completions were counted and the terminal response times were averaged.

A throughput factor (T) was defined based upon the number of job completions, and normalized to a unit job. This expression of the value of work done by the entire system in one hour, was plotted on a graph. Another graph of average interactive terminal response time was plotted.

The job mix descriptions, although typical, can not represent every possible application. But together with the ratings of job throughput and response, the job mixes and ratings define what the HP3000 Series II can do in a series of environments. Job performance rating is an attempt to address the problem of measuring interactive multi-programming machines. Hewlett-Packard offers the results of this job performance rating technique to help prospects evaluate whether the HP3000 Series II capabilities match their computing needs. For more information check C on the response card to receive your copy of "Performance Summary." hp

TIMESHARING MIX	
13 INTERACTIVE USERS	2 BATCH USERS
Enter BASIC interpreter. Retrieve prestored BASIC program from disc. Modify the program. List parts of it Execute the program feeding it 4 data records. Repeat preceding three lines Name the program Save the program Exit the BASIC interpreter. Repeat	• A 4000 line BASIC compiled program generating a disc file and printing a 500 line report • Above job executed under BASIC interpreter

SCIENTIFIC MIX	
6 INTERACTIVE USERS	4 BATCH USERS
• 3 FORTRAN program development • 3 BASIC interpreter program development	• 4000 statement BASIC program compile, execute and print a 500 line report • 1360 statement FORTRAN compile, execute and print of a 29 page report • A 4000 line BASIC compiled program generating a disc file and printing a 500 line report • Above job executed under BASIC interpreter



INNOVATIONS IN MEMORY TECHNOLOGY

Memory With A Memory

The Series II features new $84 per kilobyte semiconductor memory. To ensure memory reliability, the process of isolating memory errors is ongoing throughout the life of each Series II system.

Experience has shown that failures in semiconductor memory typically occur early in the life cycle. Consequently, pre-production RAMS are subjected to extensive "burn-ins" and computerized testing. Further oven tests monitored by computer are conducted on chips mounted on circuit boards and built into computers.

Testing for memory faults continues even after the system is installed at a customer site. A significant characteristic of the HP3000 Series II memory is its ability to correct single bit errors. Five checking bits not only determine when an error occurs in any 21-bit word (16-data bits, and 5-error correcting bits) but also locate and correct the failing bit. Fault correcting memory is not new in the computer industry, but a memory with defective chips is inherently less reliable, so the Series II memory remembers its faults. Information necessary to locate error prone chips is recorded in a logging RAM. Approximately once per hour, the information is automatically written to a disc file by the Series II operating system. A program can be run at any time to list a report identifying each chip that has failed and indicating the number of times a failure has occurred. With this information in hand, the HP customer engineer can simply replace faulty chips during routine maintenance.

The entire Fault Control process occurs without loss of memory speed, and, as the memory self-corrects, without urgency. Defective chips can be replaced at leisure. This unique Fault Control memory with error logging is innovative in the computer industry. The HP3000 Series II introduces memory with a memory.

Use of dynamic MOS semi-conductor memory results in costs savings that are passed on to the customer. A core 32K byte memory board for the 3000CX cost $10,000. The new Series II 64K byte semi-conductor memory module with 18 pin 4K RAMS costs only $5,400. Series II memory brings twice the density at approximately one-half the price.

Series II memory is large, expandable to 512 bytes; and fast. Memory access time is 350 nanoseconds. Semi-conductor memory is volatile, so a standard sixty minute battery supply supports the memory during brownouts and power failures.

Memory With A Manager

The Series II uses high-speed discs to augment main memory in an efficient scheme known as virtual memory. A Memory Allocation Manager (MAM) controls needed transfers or "swaps" of programs and data between disc and main memory.

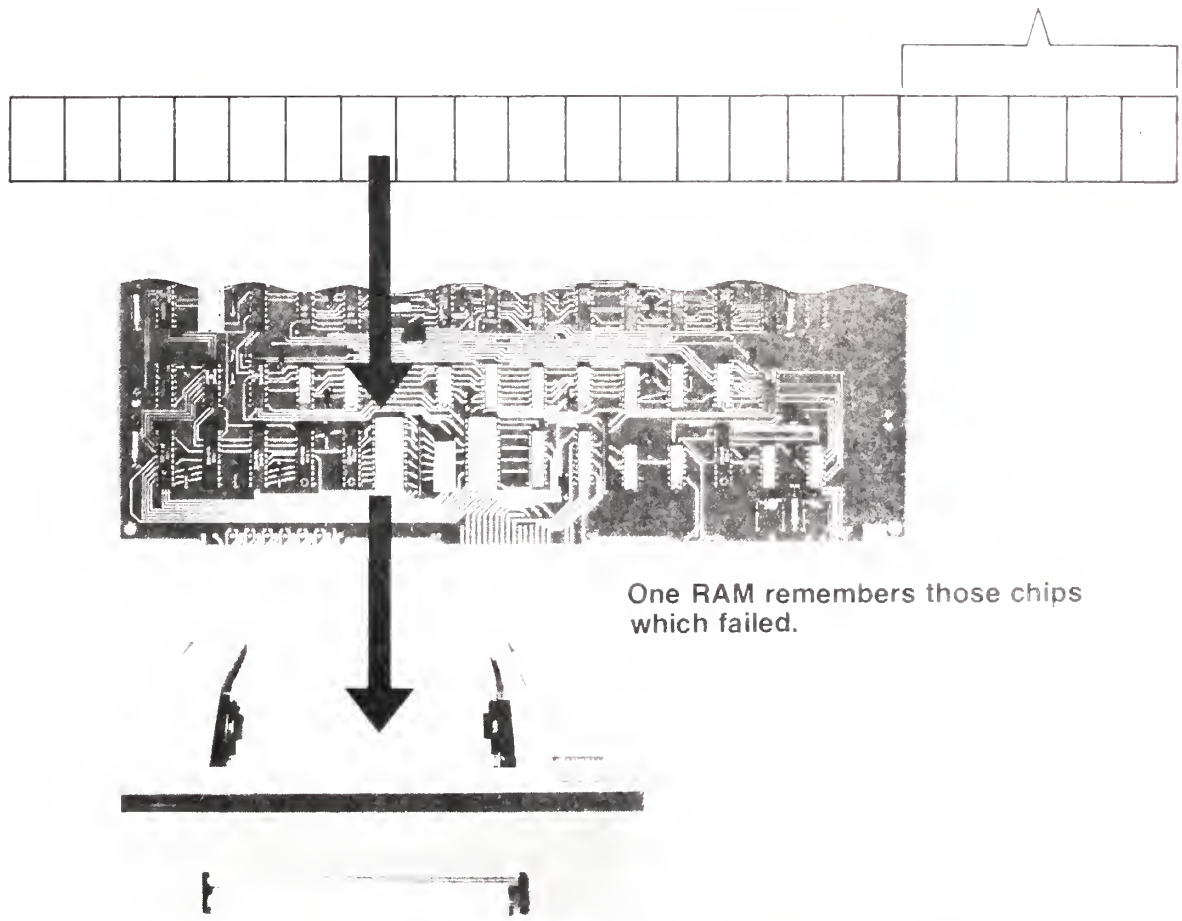
The fundamental unit of virtual memory transfer is a variable length segment of logically related information. In a virtual memory system, efficiency is gained when needed segments are ready in main memory and do not require a time consuming swap from disc. Implementation of a new algorithm used by MAM maximizes this efficiency. The "Segment Frequency Algorithm" (SFA) keeps a running history of segment use in main memory. Only segments whose past history indicates a high percentage of reuse remain in main memory. Each program is given just enough main memory to run efficiently.

Memory checkerboarding is reduced by MAM. The Memory Allocation Manager finds needed memory space by careful relocation of a segment if it separates two "free" areas. This technique (known as the "Local Compression Algorith") creates free space, and discourages fragmentation of main memory.

To receive a technical summary of the Series II check B on the reply card. *hp*

Fault Control Memory

Five bits check and correct the 3000 Series II semi-conductor memory.



One RAM remembers those chips which failed.

A report indicates which faulty chips should be replaced. Until then Series II Fault Control memory keeps on correcting with no loss of memory speed.

HEWLETT-PACKARD 3000 SERIES II FEATURES FIRMWARE ASSISTED SOFTWARE

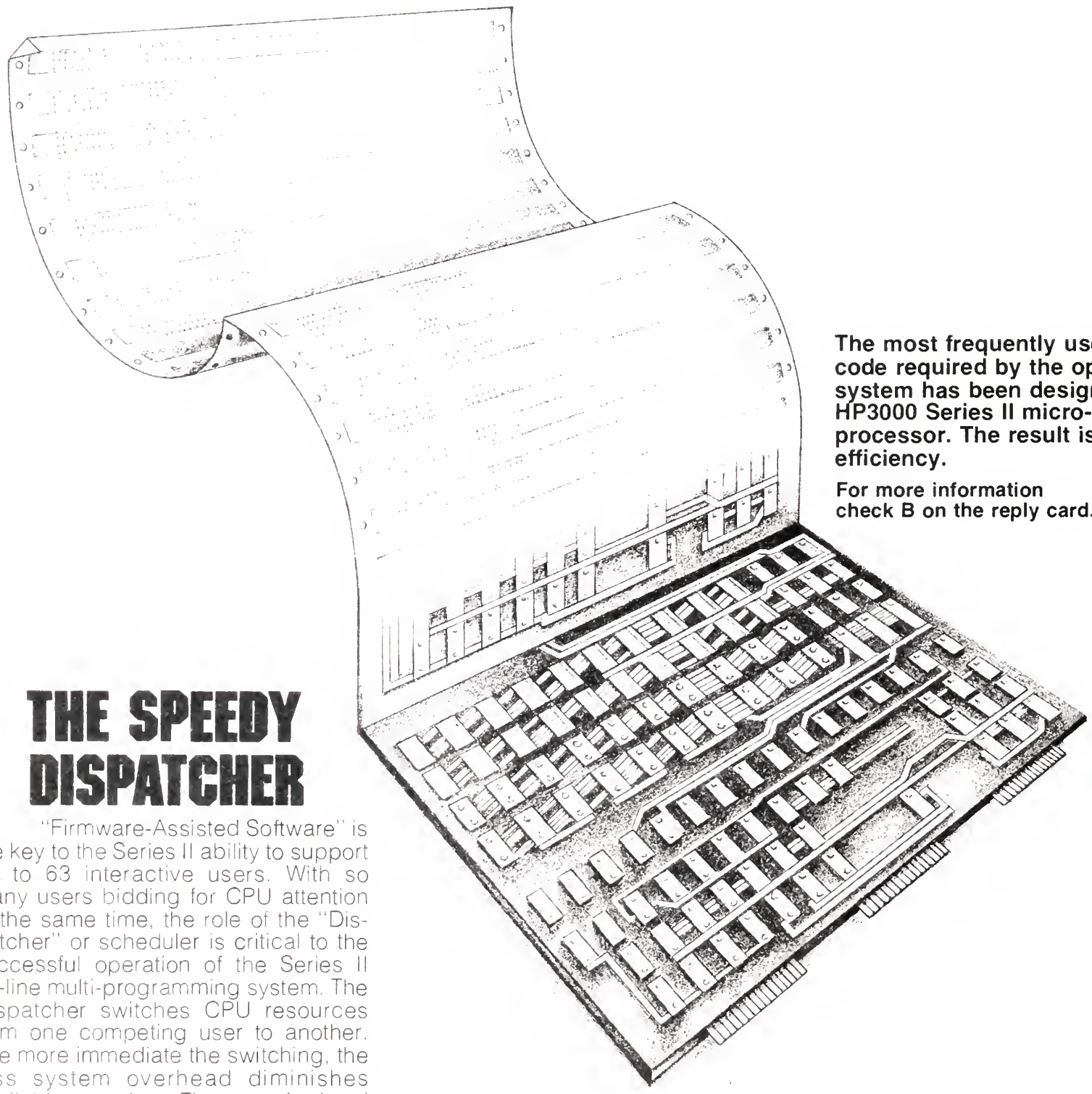
In the 3000 Series II, Hewlett-Packard has gone beyond implementing the base instruction set of the CPU in microcode. Parts of the operating system that normally would be software have been microcoded. We like to refer to these as "Firmware-Assisted Software".

These operating system functions, if executed in non-firmware-assisted software, would be characterized by lengthy program sequences. In their Series II microcoded form, the single composite instruction executes in a few cycles of the microprogrammed CPU. Microcoding means high-processing speeds and a high result/instruction ratio.

One example of such time savings is the "IXIT" instruction. "IXIT's" most common usage is to determine if the scheduler's existing job queue and priorities need to be reexamined as the result of an I/O interrupt. If a reprioritizing is indicated, "IXIT" activates the dormant "Dispatcher." When executed in software form, this procedure took 155 microseconds. Now, in its Firmware-Assisted Software form, execution-time is 24 microseconds or six and one half times faster. One single firmware instruction replaced approximately 30 software instructions.

Firmware-Assisted Software functions for the HP3000 Series II include repetitive operations like subprogram linkage, string processing, buffer transfers, and such integral functions as the "Dispatcher" or scheduler.

Heart of the Hewlett-Packard 3000 Series II is a 32-bit, pipelined, microprogrammed processor with a cycle time of 175 nanoseconds. This microprogrammed processor supports 209 instructions. Eighteen of these standard instructions are extended, precision floating-point and decimal operations. The microcode instructions and Firmware-Assisted Software occupy 4K microprogramming words. The HP3000 Series II has a total of 10K words of control store available accommodating an additional 6K for future growth. hp



The most frequently used software code required by the operating system has been designed into the HP3000 Series II micro-programmed processor. The result is speed and efficiency.

For more information check B on the reply card.

THE SPEEDY DISPATCHER

"Firmware-Assisted Software" is the key to the Series II ability to support up to 63 interactive users. With so many users bidding for CPU attention at the same time, the role of the "Dispatcher" or scheduler is critical to the successful operation of the Series II on-line multi-programming system. The Dispatcher switches CPU resources from one competing user to another. The more immediate the switching, the less system overhead diminishes available user time. Firmware-Assisted Software allows the Dispatcher to switch in only 750 microseconds. hp

ONE SECOND IN THE LIFE OF A SERIES II

To explore the internal intricacies of a concurrent batch and interactive system, we tracked MPE II, the powerful multi-programming operating system of the Series II, for one second. MPE II dynamically allocates resources such as main memory, processing time, and peripheral devices to each user as needed.

The state-of-the-art "working set" memory manager employs a "Segment Frequency Algorithm" (SFA) to optimize main virtual memory use. In this second, jobs similar to the data processing mix described earlier are handled by MPE II. Just to keep the processors active, three more interactive users were added for a total job mix of four-batch and six-interactive users.

EDIT 1 The second starts off with the all important Dispatcher checking its internal queue of ready users. First on the list is an interactive user in the EDITOR subsystem working through program modifications. With the three-milliseconds of CPU time, our busy editor modifies COBOL source code. The modified lines are quickly transferred back out to disc, to prepare space for the next set of lines to be modified. The system's separate I/O processor handled this data movement at the same time the CPU continued with the next activity. Time Check: 3 Milliseconds.

The CPU can't ignore the energetic Spooler one millisecond longer. The Spooler's role in life is to keep track and prioritize those who need non-shareable devices like mag tapes and printers. The Spooler has been handling an earlier request to print out a listing. It sets up another 16 lines in main memory ready to begin automatic printing. Time Check: 34 Milliseconds.

EDIT 2 No rest for the hustling line printer. Another interactive COBOL user has decided to take a hard-copy version of his program home to study in peace and quiet. However, some system code necessary to perform this operation isn't in main memory and there's no space. The CPU needs the aid of the Memory Allocation Manager (MAM). MAM is responsible for making virtual memory a reality. In this instance, MAM performs two functions: First it determines those segments of memory that have fallen into disuse and are available as free space. Next, it uses the Local Compression Algorithm to consolidate selected free memory spaces into one contiguous area. Now MAM can swap the needed code in from disc to main memory and complete the request. Time Check: 50 Milliseconds.

EDIT 1 Meanwhile, the first interactive COBOL user is still modifying source. Some of the code he's using is identical to that used by other interactive users on the system. The Series II cleverly stores code (program instructions) and data (program variables) separately in main memory so that such identical code segments can be shared. This is a great way to save memory space. A few more lines are modified. Time Check: 66 Milliseconds.

COBOL A batch user requests data to be moved from disc file to a working space in main memory while the separate I/O processor handles this data transfer. Time Check: 71 Milliseconds.

RPG Simultaneously the CPU is given to an RPG compile which requests another data transfer. Time Check: 84 Milliseconds.

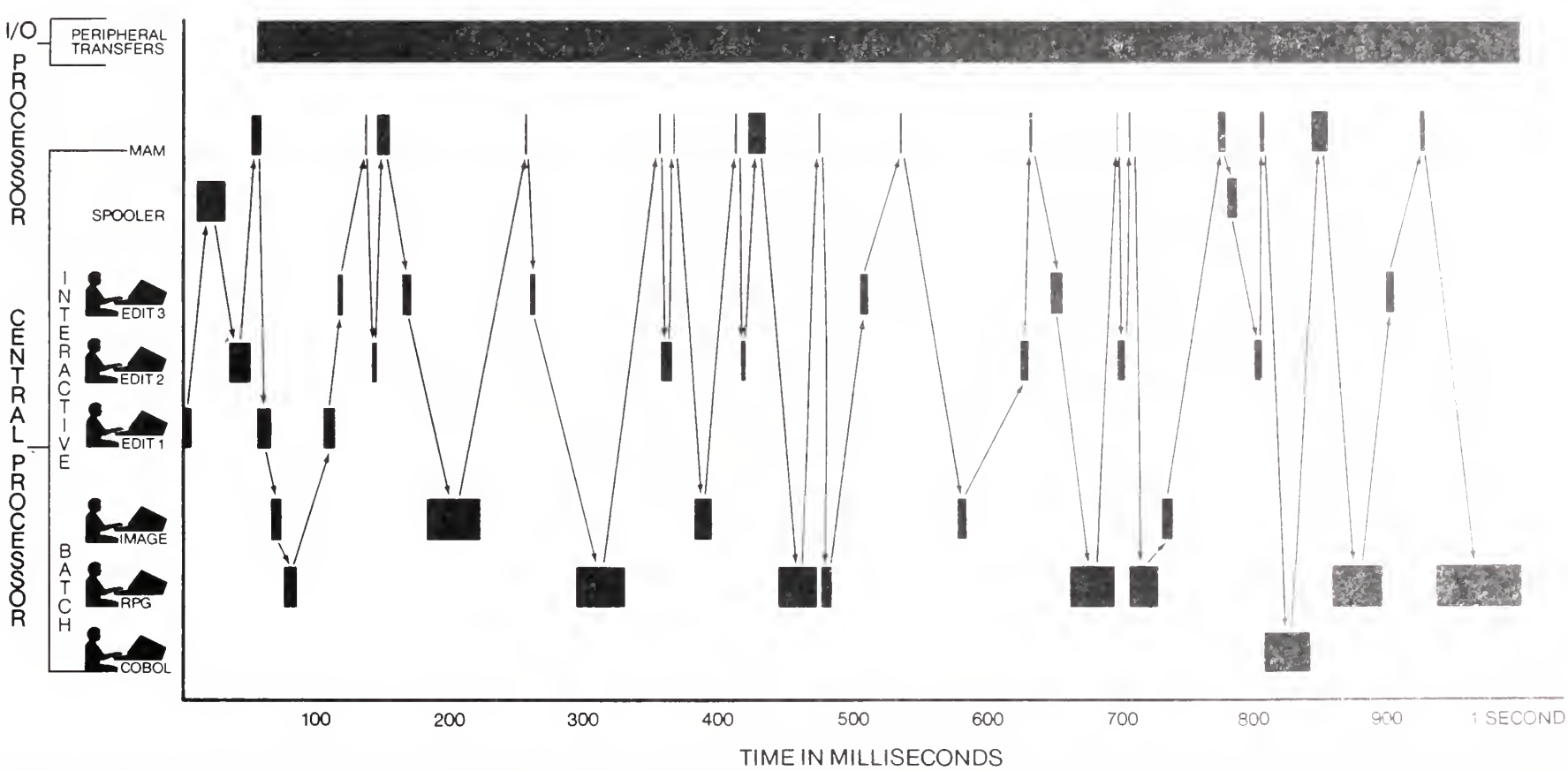
EDIT 1 Remember our first COBOL user? With this swatch of CPU time, he completes his modifications and is prompted by the EDITOR for another command. Time Check: 112 Milliseconds.

And so on for the rest of the busy second. Each user gets CPU action for a slice of time. You probably noticed that only six of the 10 users had CPU attention. The Dispatcher determined that this specific load factor achieved the most efficient CPU use.

The total amount of work accomplished during this one second was 2,280,000 micro instructions in the central processor, 14 file accesses, seven input swaps, and five output swaps.

hp

ONE SECOND IN THE LIFE OF A 3000 SERIES II.



Rapid switching of system resources, and concurrent CPU and I/O processor activity mean each user feels she/he has the total power of the HP3000 Series II on command. In this second from the life of a standard Series II, system overhead took only 12.5 percent. For more information check B on the reply card.

USER TESTED PERFORMANCE

Longs Drug Stores and Hughes accelerate Data Processsing with 3000 Series II

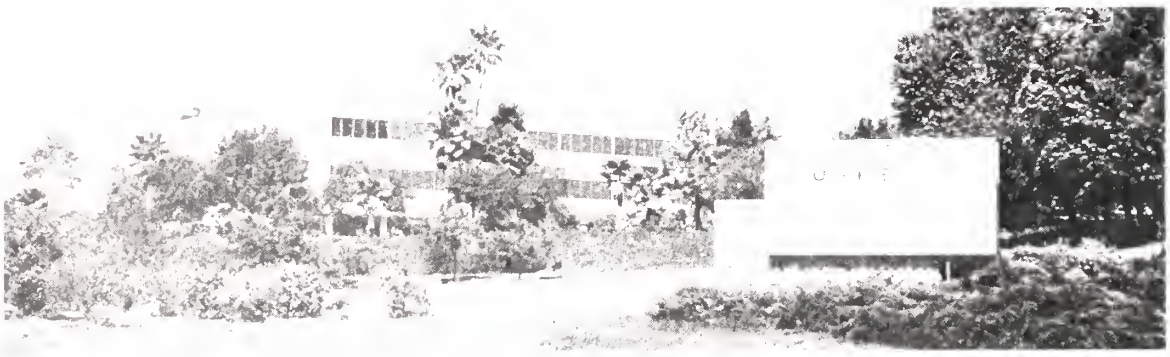
Hughes Aircraft Company's activities today span more than 80 major areas and include more than 550 products.

Hughes' Ground Systems Group typifies the technical sophistication and advances inherent in the Hughes' approach. New demands for computerization are continuous and diverse, making computer system flexibility essential. Hughes' Ground Systems Group's Manufacturing Division chose an HP 3000 as a machine that fit manufacturing business processing, as well as computerizing of manufacturing and testing processes of all their products. The 3000CX has the ability to serve these three functions simultaneously. Hughes' varied demands on the system created a perfect 3000 Series II test site. The new Series II, delivered on March 19, 1976 was operational within a day according to James Jones, Project Head in Computer-Aided-Test Systems (CAT).

CAT and Computer Aided Manufacturing (CAM) are in the development stage now. With over 4000 hours of programming work on the old 3000, Hughes was concerned about conversion to the new system, but these programs were simply transferred using the RESTORE utility. A few special cases did need to be compiled. Conversion was as simple as loading a mag tape.

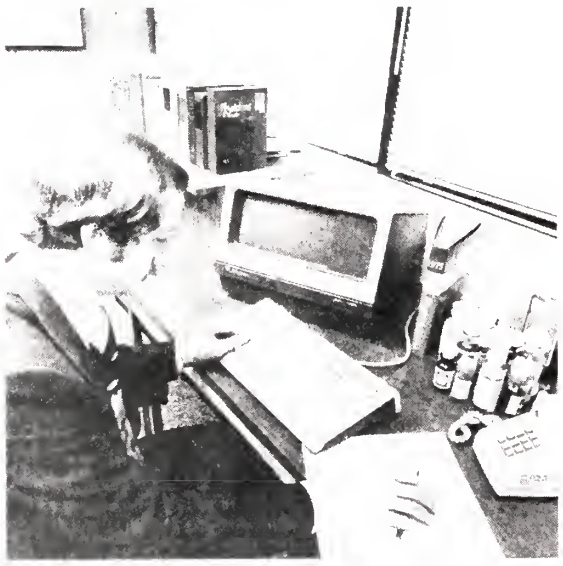
Commenting on performance, Jones observed that the Series II was able to process a typical request from one of six test station satellites three times faster than HP's 3000CX. This same network also interfaces with two IBM 370's at the Corporate headquarters for processing financial and labor data.

Hughes estimates that 80 percent or better of their manufacturing processes will be automated. Hughes anticipates throughput yields of double to triple today's standards. Key to that kind of performance is a consistently reliable and versatile general purpose computer like the 3000 Series II.



With the HP 3000 Series II, Hughes expands its ability to perform three functions: manufacturing business processing, and computer aided manufacturing and testing.

Longs Drug Stores have experienced fast growth and expanding computerization for the past ten years. Sales of the retail drug chain, headquartered in Walnut Creek, California, grew at a compounded rate of 22 percent reaching $410 million in the last fiscal year through 92 stores located in California and Hawaii. The result: a burgeoning increase in data processing work load, which Longs has chosen to meet with mini-computers rather than with the traditional large mainframes.



The HP 3000 Series II was operational at Longs Drugs Data Processing Center four hours after it came off the truck.

Longs has used a Hewlett-Packard 3000CX system as its main computer since 1974. Most data files are structured by HP's IMAGE Data Base System and are processed either with COBOL programs or IMAGE'S QUERY language. Batch processing is usually done during the night shifts with interactive terminal work assigned top priority during the day. Very heavy system use made Longs ideal for field testing of the new HP 3000 Series II.

According to Bill Gates, Longs Data Processing Manager, "We fully expected to encounter many problems with our Series II test system. After all, a main purpose of field testing is to discover any remaining bugs in the hardware or software. However, we found the system to be very reliable and stable from the beginning. As HP systems are factory integrated and tested prior to customer shipments, the Customer Engineers had it operational four hours after it came off the truck."

Longs performed many comparison tests between their HP 3000CX and the Series II, and now uses the new system for most of their production and development. According to Gates, the test results are significant: "We found the Series II executes our batch jobs 30 percent faster. We have also seen increased speed with our COBOL compilations. For example, three of these compiles take 98 minutes on the HP 3000CX. On the Series II, the execution time is only 37 minutes. Terminal response time has also shortened noticeably. The effect of additional main memory is that more terminal users and batch jobs may be added without degrading system performance.

"We have been using our test system very heavily", says Gates, "and have discovered only one software problem of any consequence, a bug in the printer spooling system's procedure to recover from a line printer paper jam. While this problem was being corrected by HP, we printed all special forms on our old system. This was an easy task since the two systems are fully software compatible."

Longs Drugs is convinced that at announcement the Series II is a solid, reliable system that sets a new standard for the industry. hp

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Little Learned From Booth's Death

Time to Accept Responsibility for Data Accuracy Here

By Kenniston W. Lord Jr.
Special to Computerworld

Nearly six months have passed since the unfortunate death of Frank Booth. Booth, you may recall, fell under a trooper's bullet when the trooper, operating with incorrect data, approached Booth's car, weapon in hand [CW, Dec. 10].

Despite the claim of Florida officials that the incident was a "one in a million" occurrence, you may also recall the incident was nearly repeated within a very short time span. The trooper was found not guilty, but what was the legacy purchased with Booth's life?

Kenniston W. Lord Jr., former president of the Society of Certified Data Processors, has been a frequent contributor to Computerworld*; this column marks his debut as a regular contributor.*

Lord welcomes all comments, suggestions and feedback on the issues raised.

Will others be protected against the storage of incorrect data? Will the potential for death because of incorrect data stored in a computer be diminished? Has Florida – or any state, for that matter – taken the steps to protect its citizens from those who would use the "letter of the file" in lieu of sound judgment? If any have, nobody knows.

It is however, reassuring to know the Federal Bureau of Investigation (FBI), through the National Crime Information Center (NCIC), has put forth an effort to overcome such errant data. In a recent communique to the states, it has now imposed upon the states the requirement to "send periodic letters" which will "certify" the accuracy of the data.

Thus it is now possible to be protected simply because the state in which you reside is willing to say you are, in fact, protected.

This is, of course, a step in the right direction – but for whom? The step appears merely to be an effort to exonerate the NCIC from any liability for death or injury resulting from the presence of state-supplied but incorrect data.

Who is protected? The FBI is protected. The Federal government is protected. The states are protected. By virtue of the ability to hide behind a rubber stamp, even the certifying state officials are protected.

Sadly, the only person not protected by this action is *you*.

The ability to "certify" state-held data, without any legal requirement to force the states to perform any tests of accuracy, is at once ludicrous, preposterous and quite possibly irresponsible. The process simply affords no protection while claiming to do so.

What should be included in such tests. To "certify" the data, should each state require a review by each of its data subjects? Should all data be verified before its use? Should there be an arbitrary ban on the use of data which is more than six months or a year old?

At what point does individual discretion about the use of data cease and legal regulation begin? What should that legal regulation include? Is it merely sufficient to say the data is perhaps 98% accurate so we'll be willing to sacrifice two people per 100?

In short, there is no clear-cut evidence the death of Frank Booth even rippled the consciences of computer people in our country, to say nothing of public officials. Unless such clear-cut evidence is forthcoming, and in very short order, one must conclude Frank Booth's death counted for nothing, even as his life counted for nothing, insofar as computers and computer people are concerned.

The lessons of Florida are clear: the existence of data is by itself harmless. It is only the injudicious use of such data which places the public in peril.

One has to wonder why the pages of *Computerworld* and other trade media

...And in This Corner

have not chronicled the demonstrated indignation of computer people across the world. They have not, of course, because no such indignation has been expressed.

But the questions which remain are equally clear: What is the right of an unsuspecting populace to be protected from the effects of inaccurate records and the misinterpretation of reporting of data? How many iterations of the Booth incident are required to cause the public to demand removal of personal data from data-handling devices?

Finally, when will our industry and the people who are employed in computer-related endeavors begin to accept the social responsibility to ensure not only that data about people is correct, but that it is properly used? The cloak of anonymity may well be disappearing.

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DP Fertile Field for Success in Art of 'Problemation'

By Louis Fried
Special to Computerworld

There is probably no art that has received more benign neglect than that known to its initiates as "problemation." Problemation is probably the oldest extant art and is devoted to the proper creation and nurture of problems.

Although its first practitioner was Eve, problemation is not an exclusively feminine art. Adam followed closely after her.

Some of the most famous people in history have shown a remarkable aptitude for practicing problemation on a grand scale. A few outstanding examples are Marie Antoinette saying "let them eat cake", Napolean invading Russia, Neville ("Peace in Our Time") Chamberlain appeasing Hitler at Munich, Mrs. Murphy (whose lantern in the cow stall started the Chicago fire), Herbert Hoover saying "prosperity is just around the corner" and Richard Nixon recording his conversations for posterity.

It should be noted the dominant theme of these examples is the planning that went into the creation of these problems (excluding, of course, Mrs. Murphy). In fact, this illustrates the two major branches of problemation: the "planned" or conscious approach and the "inadvertent" or unconscious approach.

Planning for Problems

By far the most successful problems are planned. With the benefits of modern technology, the most fertile field in the history of mankind has been developed – the computer data processing field.

This field provides the serendipitous combination of immense opportunity with careful detailed planning. As a result of DP during the last 10 years, never have so few done so much to so many. And the future holds even more promise.

The planned approach is usually most evident on major projects. It requires the use of the best available planning tolls with careful attention to ignoring a few key facts.

This is essential and, with careful training, even a novice can detect the appropriate key facts that should be considered inconsequential.

For example, a dollar amount field can be designed for three digits because "only" .5% of the transactions exceed $999. A validation table can be built into a program, since it "only" changes two or three times a year. A program to maintain an archive file doesn't need to provide the ability to delete records because that "hardly ever happens."

Some 'Classics'

A few "classics" in the field are somehow constantly repeated are illustrated by the following quotations (those who uttered them shall remain anonymous):

- "We can save one more character in the record by using only one position for the year indication."
- "Our on-line system has an unbreakable security method to protect your files and programs."
- "This program modification is so slight that it doesn't have to be tested."
- "At this point in the schedule the hardware should be delivered because all the software will be completed."
- "This project will cost $474,095 and be completed by July 30."

The inadvertent approach to problem creation relies primarily on the subconscious. It must, therefore, be discussed in psychological terms.

The simplest way to excel in this method is through active self-improvement directed toward the development of an overweening ego. (A weening ego alone is not enough).

This places one in the enviable position of knowing that one is always right and makes it easier to ignore the questions raised or facts presented by others.

Further, the inadvertent approach is conducive to exceeding authority and taking unnecessary or unjustifiable risks. It can contribute to a mastery of obtuse personnel management practices.

A hair-trigger defensive reaction can be a big help. Cultivation of this attribute can quickly lead to a situation where one will not be bothered by anyone else venturing an opinion or offering contradictory facts.

A more complex approach is the result of hidden anxiety or guilt feelings that permit the subconscious to set traps. Oversights or errors are the product of the subconscious trying to punish the conscious.

This is actually a happy circumstance because it allows the problem creator to operate with the best of intentions. This method is so common that the technical term "schlemiel" has been developed to identify the syndrome.

The beauty of the inadvertent approach lies in the ease with which the blame for problems can be rationalized as being someone else's fault. Of course, its drawback is that even the most skilled practitioner cannot take credit for the problems he has created.

Measuring Success

Success in the field of problemation is inversely related to "success" as it is measured by the conventional arts and sciences. However, the ultimate in success is the ability to rise high enough in the conventional world to make the final problem one of tremendous impact.

Napolean, Chamberlain and Nixon are great figures in the history of problemation because they had the tenacity to achieve that one great problem.

Dextrous application of the art of problemation can lead to the fuller life containing the kinds of misadventures one dreamed about in childhood, but which are rarely achieved as an adult.

Remember in the field of problemation there is no substitute for doing it yourself. And with the aid of modern computer technology, the horizons for accomplishment are unlimited.

Fried is manager of corporate management information systems for Ampex Corp. in Redwood City, Calif.

Reader Commentary

Letters to the Editor

Asterisks Help Control Name-Suffix Blunders

The May 10 Taylor Report on name-suffix blunders and comma control outlined system methodology similar to that used by my firm. We use a control method based on asterisks.

A single asterisk is required following the title and preceding the last name. This is followed by asterisk, first name, asterisk, middle initial and asterisk.

For example, Mr. Nathan W. Louis would be inputted as: Mr.*Louis*Nathan*W*. If Mr. Louis was a Certified Public Accountant, input would be: Mr. *Louis*CPA*Nathan*W*.

The string transposition assumes that the entire last name follows the first asterisk and ends as of the first blank character or the second asterisk, whichever occurs first.

Our name control system is based on the concept that a maximum of four asterisks would be inputted. Consequently, Liberace would be keyed as *Liberace*** and Capt. Robert A.G. Jackson As Capt. *Jackson*Robert*AG*.

Harvey R. Weisthal
Systems Analyst

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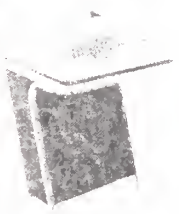

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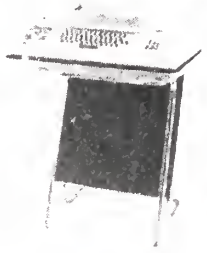

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Letters to the Editor

Revision of FCRA Needed To Prevent Privacy Abuse

I must take issue with the interpretation of the Fair Credit Reporting Act (FCRA) given by J.V. White, president of the Credit Bureau, Inc. in Atlanta, Ga. [CW, April 5]. He stated that the FCRA limits the conditions under which a credit report may be issued to a governmental agency.

I am sorry to report that his industry was successful in making sure that the limits as stated in the law were effectively empty.

To quote from the law: "A consumer reporting agency may furnish a consumer report under the following conditions and no other:

(1) In response to court order.

(2) In accordance with the written instructions of the consumer to whom it relates.

(3) To a person which it has reason to believe, for credit, for employment, for insurance, for a license or otherwise has a legitimate business need for the information in connection with a business transaction involving the consumer.

"Notwithstanding the provisions of Section 604, a consumer reporting agency may furnish identifying information respecting any consumer, limited to his name, address, places of employment or former places of employment, to a governmental agency [for any purpose and without the knowledge of the consumer on whom the information pertains]."

While some terms in the law are open to interpretation (such as "business need"), it would seem to me that the government's hands are not tied if they want to get information on an individual.

I found White's position to be particularly noble, but the potential for abuse of individual rights of privacy and due process (including the right to advance notice of any nonroutine disclosure) is sufficiently great to warrant a revision of the FCRA and extension to other private-sector industries.

Gordon C. Everest

Minneapolis, Minn.

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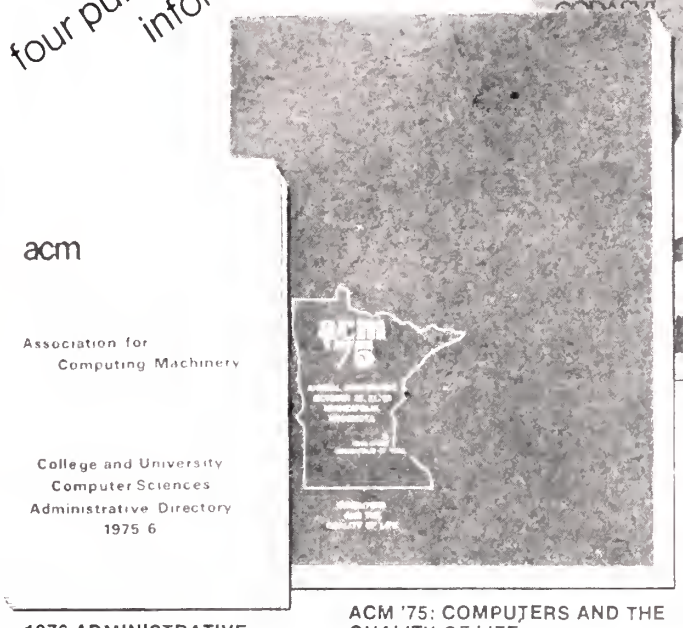

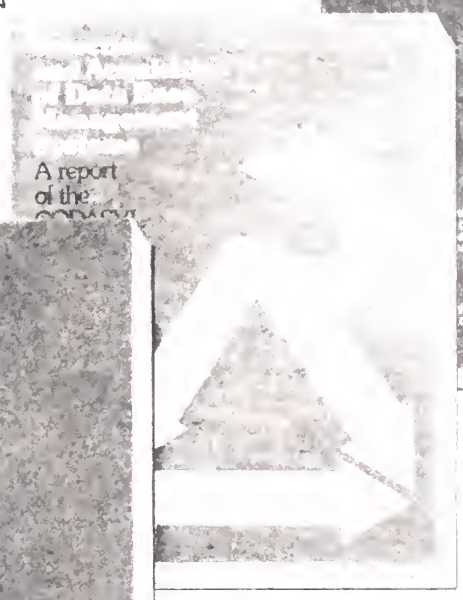

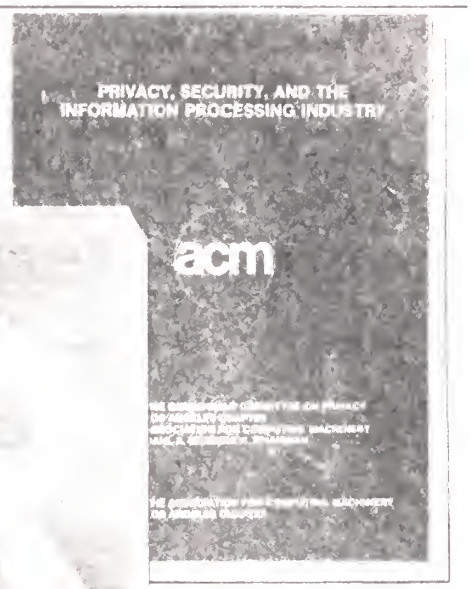

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ACM is the sole source in North America for this Report of the CODASYL Systems Committee. March, 1976. 276 pages.

This report presents alternatives for the selection and acquisition of a data base management system as part of the development of an automated information processing system. It is the third in a series of CODASYL Systems Committee reports. It is addressed primarily to the team responsible for evaluating the needs for selection and acquisition of a data base management system.

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A Report of the Ombudsman Committee on Privacy, Los Angeles Chapter, ACM, Dahl A. Gerberick, Chairman. March, 1976. 200 pages.

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C-6

Ignoring Defaults Means Choices Made Randomly by System

(Continued from Page 25)

only temporary.

However, whether I buy the reason or not is irrelevent. The information supplied, even if wrong, appeared from the form to be supplied as an act of courtesy, nothing more.

Nothing is said regarding possible reviews of the decision or action to be taken to reverse it – except the implied invitation to go to the FTC if it is believed there is discrimination involved.

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And here again, the legal system has fallen down, because it does not indicate what should be done if the information itself or its use is challenged. By default, perhaps, it was implied that we should go to the address printed on the top, but no information was given as to how it should be done or with what prospects of success.

Computer Defaults

All of this may seem far removed from computers and computer systems. Yet, in this easily understandable example, the complexity of all default systems is apparent, as also is the way in which abuses can continue after apparently being cured.

The continuation of abuses in computer systems in the Automated Decision Making Application areas has recently been shown by the General Accounting Office (GAO) [CW, May 17]. What was not shown in its report was the complexity of any default systems involved in really preventing the continuation of abuses.

It was with this in mind, the understanding of the default systems, that this report was written. Unless default complexity is appreciated, the actions taken to halt abuses are liable to end up perpetuating the same or other abuses.

Running Automated Decision Making Applications in the absence of carefully thought-out, documented and flexible default systems protecting the integrity of the decision-making application itself is a risky business, as GAO has just told us.

Until we have such controlled default systems, the quality of applications probably will not drastically improve, any more than the quality of software transferability did before we got controlled default hardware systems over 10 years ago. But, when we do get there, watch out as computers really get better quickly!

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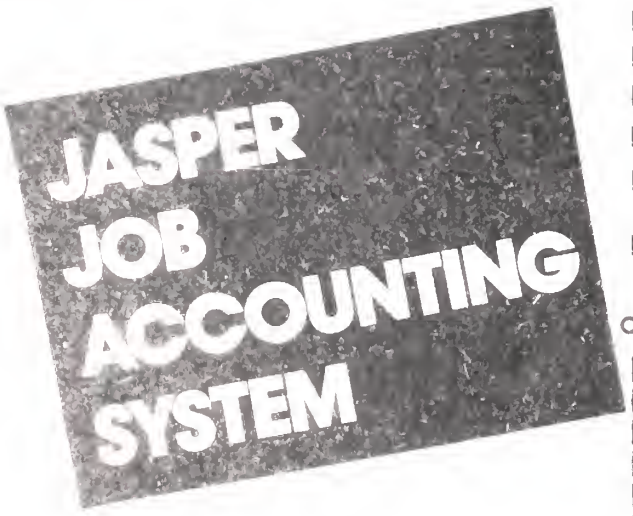

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'ISP' Uses Shared DASDs to Balance Multiple 370s

By Don Leavitt
Of the CW Staff

LONG BEACH, Calif. – The Intersystem Spooling Processor (ISP) package from Tone Software Corp. resolves the problem in which multiple IBM 370s running under VS1 share disk storage and other resources but are unable to communicate and therefore cannot effectively share the work, the vendor said.

The software can support two to 36 CPUs concurrently and work with any 370-compatible peripheral devices except diskettes, a spokesman claimed.

ISP enables CPUs to transfer job control and both input and output from one CPU to any other in the configuration if both share the same direct access storage devices (DASD), Tone said.

Normally jobs are processed within the CPU in which they are entered; with ISP, however, the user may alter jobstream control parameters to send a job to a specific CPU if, for example, it has particular peripherals that must be used, the spokesman said.

Without that change, ISP will send the job wherever it can be processed first, he added.

The user can now pool card reader/punch and printer resources to avoid duplication of equipment and to run those utility operations on the CPU that will give the most efficient spool processing, Tone said.

'Significant' Space Savings

Transmission of output data to subsequent CPUs is implemented using the shared DASDs with redundant data compression, the vendor noted.

This offers a "significant" space saving "approximately 38%" compared with the IBM-supported Job Entry System (JES) spool, Tone claimed.

Meanwhile, pooling of I/O on one CPU allows JES to optimize the use of the available peripherals, and overall turnaround time "may be substantially reduced," the independent added.

Other ISP features include the ability of a running batch job to "release" a subsequent job, the ability to have finished steps made available for printing prior to job termination and the ability to "submit" another job based on conditions sensed during processing, Tone said.

The software system was designed to operate under Release 3.0 and later versions of IBM's VS1. Approximately 250 tracks of shared DASD space are required for every 1,000 pages of spooled data, the spokesman said.

The main storage requirement is dependent on the function of the CPU. Approximately 8,200 bytes of virtual storage are required for each system sending output; about 2K is needed by the CPU controlling the unit record peripherals.

Operating speed depends on the CPU and its peripherals, Tone added.

While ISP may be used in conjunction with Tone's terminal support software, it was designed for stand-alone operation, the spokesman emphasized.

ISP is expected to be available July 1 for a one-time license fee of $11,500. Alternatively, it can be acquired on a 12-month paid-up lease arrangement for $1,150/mo, Tone said.

The firm can be reached at P.O. Box 1127, 4549 E. Anaheim St., Long Beach, Calif. 90801.

'Sara-H' Supports Measurement, Tuning, Billing of HIS Systems

FALLS CHURCH, Va. – Easy accessibility to a small number of management indicators which describe both system operation and useful production was the chief design goal of the Systems Analysis and Resources Accounting for Honeywell (Sara-H) package, according to its vendor, Boeing Computer Services, Inc. (BCS).

A rewrite of the original Sara for IBM sites, Sara-H is intended for use with large-scale Honeywell Information Systems (HIS) CPUs. It uses the Geos-generated Statistical Collection File (SCF) as input, BCS said.

Output may be selected from a range of available reports, but the most significant figures are what BCS has named Resources Utilization Time (RUT) and Computer Resource Units (CRU).

RUT is an estimate of the stand-alone running time of an activity while a CRU is a measure of the system capacity demanded by an activity, BCS said.

The CRU has been designed to be repeatable – if the same activity is executed several times, the same CRU value should be obtained, BCS explained.

By doing this, the CRU can be used for billing by associating a dollar value with it, a spokesman added.

These management indicators provide a measure of multiprogramming level on the one hand and of job lengthening due to multiprogramming on the other, he said.

They also indicate the effectiveness and efficiency of a computer system as a function of a base configuration and workload requirements, he added.

No Special Overhead

The use of Sara-H adds no special overhead to the processing of an installation's normal workload, BCS said; the only data used is from the accounting data file regularly collected by the system, and Sara-H runs as an application program, the company noted.

The reports produced include data on individual device usage by processing period; resource levels required by individual major system components; and analysis of Time Sharing System (TSS) operations on the session and subsystem level.

Sara-H can be used on any HIS system utilizing Geos as its operating environment. It is available in executable object code form for $10,000, but installation support and training may add as much as $5,000 more to that figure, BCS said.

The package is being marketed by the Space and Military Applications Division of BCS at Suite 217, 7777 Leesburg Pike, Falls Church, Va. 22043.

'Belatrix' Eases DG Edit Jobs

CHATTANOOGA, Tenn. – Described by a user as "more powerful than any editor available from Data General [DG]," Belatrix, a multiple-user interactive text editor and source program maintenance program, is now available from Greg Hullender, the developer.

The Hullender software runs on any DG system that functions under RDOS, supporting as many as 32 simultaneous terminal users in 64K of memory. It can be used with less memory, but response time would degrade if the full potential user load was active in the smaller environment at the same time, a spokesman said.

Full Bag of Tricks

The package includes features such as macro commands, facilities to search for strings of characters and other capabilities necessary for editing source programs, JCL procedure streams, data or text files, he added.

"Unlike anything DG has," Belatrix allows editing to proceed simultaneously on programs written in Assembler, Fortran, Algol, Cobol "or any other language which uses a source file." There is no degradation if more than one user works with the same language, the spokesman noted.

Text editing, also provided by Belatrix, is based largely on the character string manipulation facilities that support source program maintenance. Letters, parts lists, catalogs and similar documents that need frequent or periodic updating could usefully be handled with this facility, Hullender said.

In operation, Belatrix moves a copy of previously stored text or source code into a work area where the user is free to make changes without damaging the original; once the editing is complete, the revised copy is put back on file, he explained.

Written in Basic, the editor is available on punched paper tape for $300. Hullender said from 456 S. Crest Road, Chattanooga, Tenn. 37401.

RSTS/E-Based PDP-11 Gains DBMS Features Through 'Data Boss'

N. MIAMI, Fla. – Data Boss from Florida Computer, Inc. (FCI) is a generalized data base management system (DBMS) currently implemented on Digital Equipment Corp. PDP-11s under RSTS/E which meets "the majority" of Codasyl standards, according to the vendor.

The system includes an English-like inquiry language and supports multiple data bases with unlimited multiple concurrent accesses of the same data base, FCI said. On the other hand, Data Boss also includes multilevel password protection, a spokesman added.

Changes and additions to data base fields can be handled easily, the spokesman said. The system provides support for hierarchical, network, inverted, random, indexed sequential, sequential and relational approaches to data base design, he continued.

Application programs used under Data Base are typically written in Basic Plus, the standard language for RSTS/E. Once under the DBMS control, they are retrieved and executed through use of an applications monitor subsystem.

The monitor, called the Data Boss Manager, controls the steps, operations and options a user accesses. It forces the user to identify the step or overall application before specifying the desired operation and then the particular type of problem to be solved by the selected operation, FCI said.

For the beginning user, the Manager can display a menu of possible choices at each level of definition, printing out whatever is selected before going on to the next level.

The experienced user can bypass the menus but still have the step, operation and option identified in words by entering three parameters separated by commas in response to the first inquiry from the Manager, FCI noted.

Since RSTS/E requires 24K words and Basic Plus another 14K, FCI recommended a 64-K-word PDP-11 as the minimum configuration for Data Boss use.

The DBMS is available along with a set of utility programs for $10,000 from the vendor at Suite 122, 99 N.W. 183rd St., N. Miami, Fla. 33169.

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Sycor Adds Cobol

ANN ARBOR, Mich. – A Cobol compiler system providing a subset of ANS Cobol '74 has been developed by Sycor, Inc. for its Series 440 clustered terminal system.

Expected to be used for work to be run in background mode, it will not replace the Terminal Application Language (TAL) as the means of coding data entry and other foregound operations, Sycor noted.

Marking the first time Cobol has been available for Sycor equipment, the compiler supports sequential, direct and indexed sequential files. It also allows segmentation of programs for execution in limited memory, Sycor said.

Scheduled for first deliveries in July, the compiler will be distributed free to Sycor 440 users, the company noted from 100 Phoenix Drive, Ann Arbor, Mich. 48104.

Package Backs Data Bases on PDP-11

CINCINNATI – The IIS Transaction Processing System (IIS/TPS) expected from Interative Information Systems (IIS) early this summer was designed to support development and use of data base applications on Digital Equipment Corp. PDP-11s.

The system runs under DEC's RSTS/E environment and can support up to 32 simultaneous terminal users; each user can access and update an on-line data base of up to 128 related files, IIS claimed.

In addition to a data base management system described as a "Codasyl subset," IIS/TPS includes the Interactive Systems Language (ISL) which was designed specifically for interactive transaction processing. It is said to be "significantly easier" to understand and use than Cobol or Fortran.

Several subsystems are built into IIS/TPS. The Transaction Dispatching System enables non-DP users to work with IIS/TPS "without having to know or understand anything but their transaction codes and password," a spokesman commented.

The Data Logging System keeps track of data base updates. It also accumulates and makes available utilization and billing information for use in tuning IIS/TPS and for charging users according to resources used, he added.

The Operator Service Facility manages all operator communication and keeps a journal of all messages sent to any system operator, the vendor said.

IIS/TPS runs as an application program under RSTS/E; other time-sharing tasks can therefore be run concurrently with the transaction-processing operations, according to IIS.

The entire IIS/TPS package will be available July 1 for a one-time charge of $15,000. Each subsystem will be available separately, the firm indicated, but individual prices have not been announced.

IIS can be reached through P.O. Box 37403, Cincinnati, Ohio 45222.

Medical Accounting Supported

N. HOLLYWOOD, Calif. – The Professional Office Management System Version II (Poms-II) from Occidental Computer Systems, Inc. (OCS) supports 360/370 OS-based in-house centers, service bureaus and other users concerned with health-care accounting, according to the vendor.

Enhancements include support for the preparation of the American Medical Association (AMA) insurance form, acceptance of input from Touch-Tone devices or Sycor terminals and reworking of some of the internal operations of the original package, OCS said.

Poms-II was designed to process several different organizations in a single run through the use of "profile" or control cards which tailor the processing to each organization's requirements in turn.

The package provides patient billing and accounts receivable support as well as generating "all of the required insurance forms" for the medical office, the firm said.

In addition to providing for the "universal" claim form recently approved by AMA, Poms-II is said to accommodate the tape-to-tape claims procedures already in use by several insurance carriers.

The file structure of Poms-II accommodates the coding structures for RVS procedure and ICDA diagnostic codes. It is also flexible enough to allow for future Professional Service Review Organization and National Health Insurance requirements, the vendor claimed.

The package supports input from IBM 1001 and compatible 10-key numeric entry pads as well as data from keypunch, Entrex key-to-disk, Sycor, Datapoint and Texas Instruments remote terminals.

Written in ANS Cobol and delivered in source code with JCL, test data and manuals, the system runs in an 80K region under OS. It is available for $24,600, the firm added from 10202 Riverside Drive, N. Hollywood, Calif. 91602.

Intel 8080 Assemblies Eased

RESTON, Va. – A resident assembler developed by Microcomputer Techniques, Inc. (MTI) for Intel's 8080-based System Design Kit (SDK) microcomputer includes full compatibility with existing assemblers; relocatable object code; and one-, two- or three-pass operation, MTI said.

The assembler occupies less than 4K bytes of storage and the object code it produces can be run on any 8080-based microcomputer, according to the vendor.

The assembler is available from stock on four preprogrammed programmable read-only memory (Prom) chips for $450 MTI said, from 1120 Reston International Center Office Building, Reston, Va. 22091.

Correction

Although data compression is a goal of many installations, the *Computerworld* Special Report did not mean to "compress" Maj. Richard Ensign's "10-Verb Language" [CW, April 26] to just nine verbs. The following should have been part of the language:

- *Compute.* A requirement to calculate the result of data elements being entered into a formula or equation when both the data and the formula have been either input or retrieved. (Normally, computation is the result of a locally programmed application program.)

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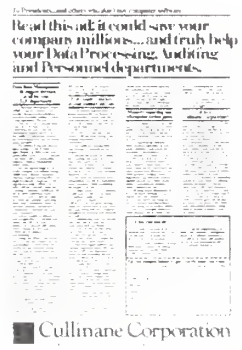

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New Verb or PERFORM Change Proposed

By Patrick V. Reese
And Susan J. LeVine
Special to Computerworld

In trying to utilize structured programming, the PERFORM UNTIL can adequately be utilized to implement the DOWHILE and DOUNTIL control structures, but occasionally the mere modification of the identifier or index until a condition is met is all the processing required.

With the current version of the PERFORM verb, a dummy paragraph must be coded, and the compiler must generate a branch and return using that paragraph name.

When the program is running, this extraneous branching must be accomplished subsequent to each test of the condition.

Please consider the following coding example:

```
PERFORM EXIT-PARAGRAPH
  VARYING IDX1 FROM IDX2 BY -1
    UNTIL TABLE-ENTRY (IDX1) =
    TABLE-ENTRY (IDX2) or IDX1 = +1
EXIT-PARAGRAPH.
  EXIT.
```

Two solutions seem apparent: The first would be to modify Format-4 of the PERFORM verb, allowing a new reserve word, NULL, as procedure-name-1. The compiler would recognize NULL and not generate the linkage to another paragraph.

The second solution would be to implment a new verb, VARY, whose syntax would follow the same rules as the VARYING option of the PERFORM verb.

Written as a letter to Codasyl's Programming Language Committee, which is responsible for the definition of Cobol, the accompanying article was also sent to Computerworld *by the authors who seek the opinions of other users on the changes they have proposed.*

The original coding example would then be implemented as follows:

Modified PERFORM:

```
PERFORM NULL
  VARYING IDX1 FROM IDX2 BY -1
    UNTIL TABLE-ENTRY (IDSX1) =
    TABLE-ENTRY (IDX2) or IDX1 = +1.
```

VARY Implementation:

```
VARY IDX1 FROM IDX2 BY -1
  UNTIL TABLE-ENTRY (IDX1) =
  TABLE—ENTRY (IDX2) or IDX1 = +1.
```

Reece is systems and programming manager and LeVine is a programmer at the Indiana Employment Security Division in Indianapolis, Ind.

IMS/360 Functions Under OS/VS With 'Hybrid' Package Support

SUNNYVALE, Calif. — A "hybrid" version of Control/IMS, a transaction accounting and performance reporting system, is now available from Boole & Babbage, Inc. (B&B) to support the use of IBM's IMS/360 in a virtual storage environment.

Normally, IMS/360 is used in a "real" environment under OS/360-370, and the newer IMS/VS is used with OS/VS. With the "hybrid" support, users can now convert from one operating system to another without having to convert data base applications simultaneously, B&B said.

While IMS accumulates some usage statistics, Control/IMS collects additional information and prepares tabular and graphic formats highlighting trends, growth patterns and saturation levels, the vendor said.

The software also accumulates data that can become the basis of chargebacks to end users, the spokesman noted.

Control/IMS is available under a perpetual license for $17,000 per site. Once one version is installed, others — the "hybrid" or the VS one, for example, if the first was for the "real" environment — can be acquired for just a maintenance fee.

B&B is at 850 Stewart Drive, Sunnyvale, Calif. 94086.

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SAN FRANCISCO — Distributors, wholesalers and manufacturers in Northern California can have turnkey, on-line support for accounts receivable, inventory control and accounts payable through the facilities of Itel Corp's Data Services Group.

Typical users might be companies that have installed or are considering small business systems, but which don't want to make the commitment in staffing required by an in-house operation, an Itel spokesman said.

These applications areas can be used in conjunction with batch payroll and general ledger processing which is currently available in the San Francisco Bay area, he added.

Serviced from an office at 750 E. 14th St., Oakland, the northern California users will in fact be linked to the Data Services Group's main computer center at 3 Corporate Park Drive, White Plains, N.Y. 10604.

Rapidata Adds Graphics To Network Capabilities

FAIRFIELD, N.J. — Rapidata, Inc.'s Probe Graphics facility is described as a means of preparing "many kinds of time graphs and cross-section scatter diagrams, including line graphs, bar graphs and histograms" on terminals, plotters or plotting terminals.

The firm's remote-computing services are headquartered at 20 New Dutch Lane, Fairfield, N.J. 07006.

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Few Gaps in Range of DP-Related Self-Study Courses

J. Daniel Couger On **Education**

The 9th annual *Guide to Audio/Visual Instruction in Data Processing*, released recently by the University of Colorado, reveals few gaps in the array of multimedia materials for self-study in data processing. Granted, there remains a shortage of materials for some highly specialized areas, such as design specification languages and microcomputers but for each of the basic instructional areas the training director now has a choice of a variety of materials.

Advanced Systems, Inc. (ASI), Deltak and Edutronics – the big three vendors in audiovisual (A/V) courses – continue to widen the gap between themselves and their competitors. The computer vendors are not producing A/V courses at anywhere near the volume of any of these companies, although Honeywell has released an excellent course on IDS, its data base management system.

Dave Cook, Honeywell's manager of education services, said many of his company's earlier courses have been updated during this past year.

The American Management Association has just released a multimedia course, "Using the Computer as a Management Tool." According to Fred Voss, director of management education systems, the course objective is twofold: to provide managers with an understanding of and a practical procedure for obtaining needed information and to improve communications between managers and DP personnel.

Rohit Patel, vice-president of product development, said 12 new courses were added to ASI's product line in the past year, including the structured programming series.

Deltak Courses

Notable among the new Deltak products are IBM 3 and System 32 courses. Larry Constantine and Ed Yourdan were instrumental in the structured design course.

Pat Sorrentino, Edutronics' vice-president for product development, indicated that firm will be releasing courses on CICS/VS, the IBM 3 and VS dumps this year.

Edutronics' new structured programming course consists of six modules, each 12 to 17 minutes in duration. The course was developed with the assistance of Prof. Gerald Weinberg, a well-known authority in the field.

A slide presentation on electronic funds transfer (EFT) systems is now available from the American Bankers Association. The course covers the purpose, the implementation approach, potential benefits and problem areas of EFT systems.

Vendors Entering the Field

Another entry to the education field is Info 3, an organization which emphasizes IBM 3-oriented products. At present the company has three courses: Duos, intended for the DP manager or system analyst, teaches the principles of system development; the Automatic Report Feature (ARF) course, an RPG-II course designed for system analysts and programmers; and Raptap RPG-II, an advanced course on programming techniques and array processing.

Management Controls Corp. (MCC) is another new vendor in the field of self-study courses. MCC has a six-unit course, each consisting of a 30-minute audio tape and workbook.

Digital Equipment Corp. has produced four self-study courses on ANS Cobol, introduction to data communication concepts, introduction to minicomputers and introduction to the PDP-11.

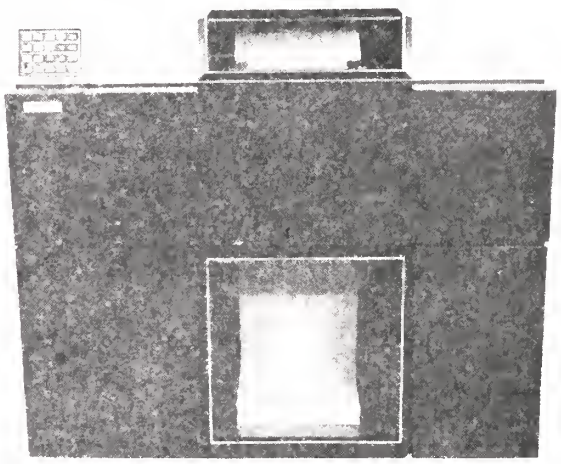
IBM has expanded its VS series of courses to include CICS. It also has a material requirements planning video course.

The *Ninth Annual Guide to A/V Instruction in Data Processing* lists the products of each of the suppliers of A/V materials. For a copy, send $4 ($5 if you require an invoice) to A/V Guide, University of Colorado, Cragmor Road, Colorado Springs, Colo. 80907.

Couger is professor of computer and management science at the University of Colorado.

DOCUMATION'S PRINTER/READER/PUNCH: YOUR IBM 360/370 WILL THINK IT'S IBM. THE PRICE PERFORMANCE RATIO WILL TELL YOU IT'S DOCUMATION.

Documation just introduced a new Printer/Reader/Punch Subsystem you should introduce to your IBM System 360.



When you replace your IBM 2540 Reader Punch and IBM 1403 Printer or 3211 with Documation's new Printer Reader/Punch Subsystem, your main frame won't notice the difference.

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You can take your choice of two printer models — our DOC 2250 (printing 2250 lpm with a 48 character set) or our DOC 1800 (printing 1800 lpm). With some extra advantages thrown in.

Operating in the 3211 mode, the DOC 2250 prints 10% faster than the 3211. The DOC 2250 costs less than half as much as the 3211. The DOC 2250's integrated microprocessor controller eliminates the need for a separate controller. And because the DOC 2250 has built-in, comprehensive microdiagnostics, maintenance can be done off-line without tying up the host system.

The DOC 2250 also offers buffered vertical format control, fully-buffered print line; operator-changeable character arrays, Universal Character Set Buffer (UCSB); up to 6-part forms, paper slew up to 100 inches per second, power cover; power stacker.

The DOC 1800 offers all the features of the DOC 2250, but at a reduced printing speed. And a reduced price.

The 1403 compatibility feature allows both models to operate in the 1403 mode. Your CPU will think it's working with a 1403. You'll know you're getting a 2250 or 1800 lpm printer for just about the cost of an 1100 lpm printer.

The read/punch side of the Subsystem (the DOC PC 6000 Reader and the DOC PC 50 Punch) recognizes the same command set as the IBM 2540. All data and control signals transferred between the host and the PC 50 and PC 6000 pass through a subsystem microprocessor controller built into the PC 6000. Utilizing Documation's own patented riffle-air pick and stack system, the PC 6000 reads 1000 cards per minute and stacks them in one of two stackers. Options include 51 Column Card Read and Optical Mark Read.

The PC 50 Punch Model 3 nominally punches 50 cards per minute; Model 4 punches 100 cpm. The PC 50's microprocessor controller enables it to detect and correct punch errors automatically without operator or host system intervention. With the Pre-Read feature Model 3 reads 300 cards per minute, Model 4 reads 400 cards per minute. Other PC 50 options include a 51 Column Card read/punch feature, an interpret feature, a second input hopper to enable off-line reproduction of card decks; a Read Column Eliminate feature and Optical Mark Read. Off-line, the PC 50 will gang-punch, reproduce and interpret, eliminating the need for extra pieces of equipment.

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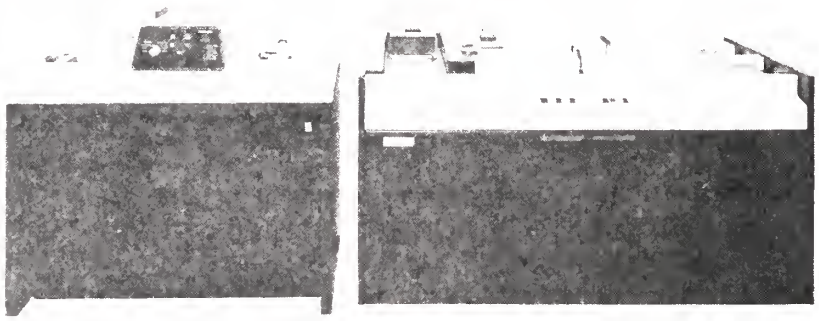

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Maritime Data Base Installed on GE Net

STAMFORD, Conn. – Designed to provide businesses and government organizations in marine transportation with on-line access to data needed for problem evaluation and decision making, the Marine Information System has been inaugurated by Marine Management Systems, Inc. (MMS).

Installed on the General Electric (GE) remote-computing network, the system is available around the clock to subscribers with teletypewriters or CRT terminals in and near the major maritime centers in North and South America, Europe, Australia and the Far East, MMS said.

Data supplied by the Marine Information System is only that classified as "public information," a spokesman noted. Included is technical information about "every commercial vessel in the world over 4,000 gross tons," daily charter fixtures, tanker casualties and other data, he added.

Participating in the implementation of the system are the American Bureau of Shipping, Lloyd's Registry of Shipping and Det Norske Veritas, all of which will be maintaining ship data for the system.

Requests for searches of the data base can be triggered from any subscriber terminal and may be shaped by whatever parameters the user defines or redefines to meet his needs.

An average per-use service charge – including the cost of the network resources – can range from $2.50 to approximately $30, depending on the complexity of the search and the subscriber's arrangements with MMS.

These arrangements may call for a substantial annual subsciption fee with lower per-use charges for heavy users or a minimal yearly fee with higher per-use costs for less frequent users. Annual fees, therefore, may range from $2,500 to $200, MMS said from 300 Broad St., Stamford, Conn. 06901.

Summer Confabs Key on Software

WASHINGTON, D.C. – Washington will be the setting for two separate conferences on software this summer; one in late June and the other a month later in July.

The Software Management Conference – at the Crystal City Marriott on June 21 and 22 – is sponsored by the Los Angeles section of the American Institute of Aeronautics & Astronautics, in cooperation with the Association for Computing Machinery (ACM) and the IEEE Computer Society.

This meeting will serve, according to the sponsors, as a forum to define both the state-of-the-art in software management and the formulation and implementation of the Department of Defense (DOD) software management "initiatives."

Directive Discussion

Specifically, DOD's plans covering system software acquisition, management, coordination and control will be defined and detailed. DOD Directive 5000.XX "Management of Computer Resources in Major Defense Systems" will be discussed and copies distributed at the conference, the sponsors added.

Registration fees range from $195 for general admission to $180 for sponsoring group members to $160 for federal, military and university personnel. Requests for information should be addressed to AIAA, Department S, 444 W. Ocean Blvd., Suite 1403, Long Beach, Calif. 90802.

In July, a three-day conference at the Twin Bridges Marriott will be somewhat less government-oriented. Titled simply "Software," it will consider technology, development, procurement and project management and focus particularly on quality, cost, security and personnel, according to the sponsoring American Institute of Industrial Engineers (AIIE).

Speakers will include Harlan Mills of IBM's Federal Systems Division, Theodore D. Puckorius, commissioner of automated data and telecommunictions service for the General Services Administration; and John Bennett, president of Applied Data Research, Inc.

Hopper, Welke And Bauer

Capt. Grace Hopper, U.S. Navy; Larry Welke, publisher of the *ICP Software Directory*; and Walter F. Bauer, president of Informatics, Inc. are also on the agenda, as are numerous technical sessions.

Planned for July 19-21, this meeting costs $295 for general admission and $265 for AIIE members, but team discounts apply if three or more people register from the same organization.

More information about this conference is available from Department SW1976TB, AIIE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025.

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Would a large international bank and thousands of other commercial operations throughout the world use Burroughs computers unless they were very good? Obviously not.

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For multi-vendor installations we can add a switch to your controller to allow you to connect the IBM-1403 to either of two different computers.

You can rent, lease or buy both the printer and controller. For full information, call or write Joe McDonough, Grumman Data Systems Corporation, 45 Crossways Park Drive, Woodbury, New York 11797. (516) 575-3034. Telex: 961 430.

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COMMUNICATIONS

FCC Halts MPL For Three Months

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – The Federal Communications Commission (FCC) has suspended for three months the proposed AT&T private line rate structured known as the Multi-Schedule Private Line (MPL) [CW, April 26].

The MPL rates were proposed by AT&T as a replacement for the existing Hi/Lo private line tariff which the FCC had earlier ruled was unjustified and discriminatory.

Under MPL, private line rates would have been based on a point-to-point pricing formula. The Hi/Lo rates, which are more complicated, require users to calculate per-mile charges based on homing points and other variables.

In suspending the MPL proposal, the commission said "substantial questions had been raised concerning the lawfulness" of the AT&T rates.

If it had taken effect, the MPL tariff would have raised rates for 15,314 users, decreased rates for 4,134 customers and left rates about the same for 727 private line subscribers, according to AT&T.

The greatest increases would have been felt by interstate users who operate at distances of less than 25 miles.

In addition to suspending the MPL tariff, the FCC ordered an investigation into the justification for the rates. This inquiry will be based on whether the proposed charges are "unjust, unreasonable or discriminatory; whether the charges conform with previous decisions relating to the relationship of AT&T with the specialized common carriers; and whether they comply with other existing FCC regulations," the commission said.

The FCC ordered AT&T to retain the Hi/Lo rates during the three-month suspension period and keep accurate accounting so refunds can be made to users if that is found to be desirable when the tariff investigation is concluded.

The Hi/Lo rates charge less for heavily used routes between major cities while the more rural routes cost users more money each month. These rates were AT&T's response to the emergence of the specialized carrier competition, most of which occurred along the more populous or "hi-density" routes.

The commission did not agree, however, and said the Hi/Lo rates were discriminatory. The MPL rates were filed as a response to an FCC order that AT&T reprice its private line tariff according to FCC guidelines.

First Node Implemented

Data Net Optimizing Records Retrieval

By John P. Hebert
Of the CW Staff

ATLANTA – A records retrieval company here serving the insurance and other industries got a jump on its future when it examined the advantages of computerized data communications over two years ago.

Realizing then that a communications network would eventually be a "necessity," Dataflow Systems planned and recently installed the first phase of a nationwide network, according to Harry V. Hewey, the company's director of systems development.

Two major reasons prompted Dataflow to take this initiative: first, the network would be needed to achieve a reduced turnaround time in accessing motor vehicle records to qualify applicants for auto insurance policies and, just as important, it would enable Dataflow to handle expanding markets, Hewey said.

"In insurance, having the network to retrieve each sate's Department of Motor Vehicle (DMV) records means a customer using the Dataflow service can write a policy and take immediate action on that decision," he said.

Pacific Region First

The first phase of the company's network handles the Pacific region – a 10-state area where half of the state's DMVs are fully or partially automated.

Fully operational since early May, the Pacific node has accomplished its objectives. It is experiencing a 24-hour turnaround time for processing drivers' DMV records and accomplishing immediate retrieval and verification of drivers' records in states where the DMV is automated, according to the system's developer and installer, Russel Information Sciences, Inc. of Torrance, Calif.

The heart of the Pacific region network – a Digital Equipment Corp. PDP-11/35 CPU with 128K bytes of core and an 88M-byte disk storage system – acts like a message-switching center. It works with five DEC PDP-11/04 minicomputers used as data entry stations in San Francisco, Los Angeles and three other California sites and one each in the other states, Dave Wilborn, Russell's system project manager, said.

Communications are handled through standard Bell System dial-up telephone lines at 2,400- and 4,800 bit/sec and Bell 201C and 300 Series modems, he added.

Asked why Dataflow went with Bell for the communications medium, Hewey explained that, while there were many other carriers, they didn't cover the areas where Bell has service.

"Many of our needs are in the lesser cities and the the boondocks, so Bell is the only realistic carrier so far," he said.

All of the communication hardware is contained in the DEC PDP-11/35, Wilborn noted. "It has all the communications, the system has no separate front-end processors or multiplexers."

(Continued on Page 50)

September Seen Earliest Time Users Can Eliminate Bell DAAs

By Ronald A. Frank
Of the CW Staff

RICHMOND, Va. – Despite legal objections to a court order which blocked the Federal Communications Commission's (FCC) plan for the certification/registration of customer-provided equipment for use on the telephone network [CW, May 10], it now appears doubtful that users will be able to eliminate their Bell-supplied Data Access Arrangements (DAA) before September.

Following the recent last-minute stay issued by an appeals court judge here, motions for reconsideration were filed by many interested parties, including the Justice Department and the FCC.

The FCC motion told the court that "with respect to possible rate increases to general subscribers . . . there is little it any possibility [that rates will be increased] . . . as a consequence of commission orders."

The FCC's motion for reconsideration further said that if the stay postponing the more liberal interconnection policy is not lifted, the affected customers "will incur substantial expenses to obtain and lease the 'protective interfaces' required under present telephone company tariffs.

"Thousands of new interface devices, which have been determined to be unnecessary, will be installed and must be paid for by innocent consumers every month the stay is in effect," the FCC said.

In asking for reconsideration, the FCC said it wanted the full panel of the Fourth Circuit Court of Appeals to review the stay order, which had been issued by only one member, Judge H.E. Widener Jr.

Unless the court decides to overturn Widener's stay order, the next date in the legal proceedings is Sept. 21. Even if the stay is lifted, the court will have to address AT&T claims that the certification/registration program authorized by the FCC should not take effect for various legal reasons.

It appears unlikely the certification/registration program will go into effect before September, according to one legal source. If the court does decide to vacate the stay order, the program could go into effect only on a temporary basis until other legal claims of AT&T are considered by the court, he said.

Auerbach to Support Data Users

NEW YORK – Auerbach Publishers, Inc. will introduce at the National Computer Conference here this week a five-level advisory service designed to assist users in data communications planning.

Called Datacomm 80, the service includes five publications available on a yearly subscription basis. Datacomm 80 is modular and users can subscribe to the level geared to their expertise in data communications and their needs in terms of products and carrier services, Auerbach said.

The entry-level offering of Datacomm 80 is a monthly report called "Datacomm Advisor."

Described as an introduction to data communications, it defines basic terms and concepts.

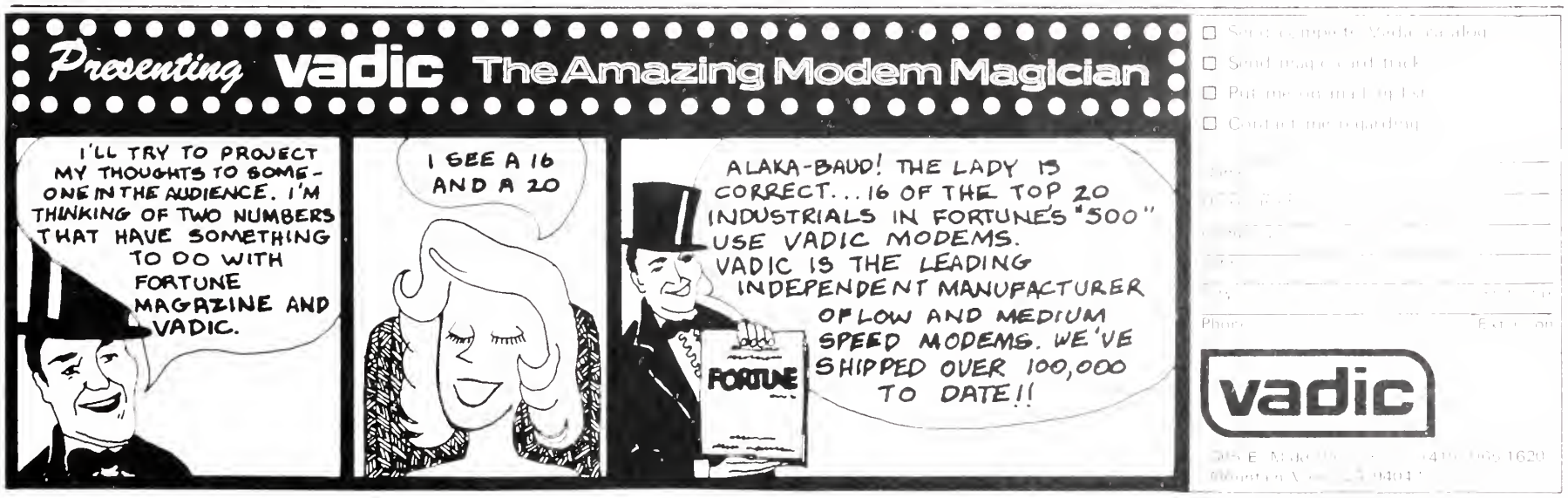
The next level is called "Data Communications Management" and is a one-volume "information service" which includes data on a planning, budgeting, designing and administering a communications system.

Next in complexity is the "Data Communications Notebook," a two-volume service with specifications and prices on 1,200 available terminals and other equipment. The fourth level is the five-volume "Data Communications Reports" with details on terminals, minicomputers, data entry systems, etc.

The final level, called "Distributed Systems" is an 11-volume "end-to-end service" for designing and implementing a distributed processing system, Auerbach said.

The "advisor" is priced at $89.95, the management service costs $125, the "Data Communications Notebook" costs $350, the "Data Communications Reports" are priced at $950 and the "Distributed Systems" volumes are available for $2,150.

All prices cover one year of service with updates. Auerbach is at 6560 North Park Drive, Pennsauken, N.J. 08109.



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Maximum features in a minimum size at minimal cost. The new Courier 278 features large display terminal characteristics. There is both a 240- or 480-character screen, such formatting functions as variable field underline, field blink, repeat character and ASCII-7 bits plus parity or EBCDIC-8 bit character sets.

To insure high reliability and ease of maintenance there are a minimum of electronic components. For example, only two circuitboards. To optimize operator comfort and performance, we've designed a non-glare /tilt screen, flicker-free display, an audible keyboard feedback, and a separate low-profile keyboard that eliminates fatiguing hand and arm positions.

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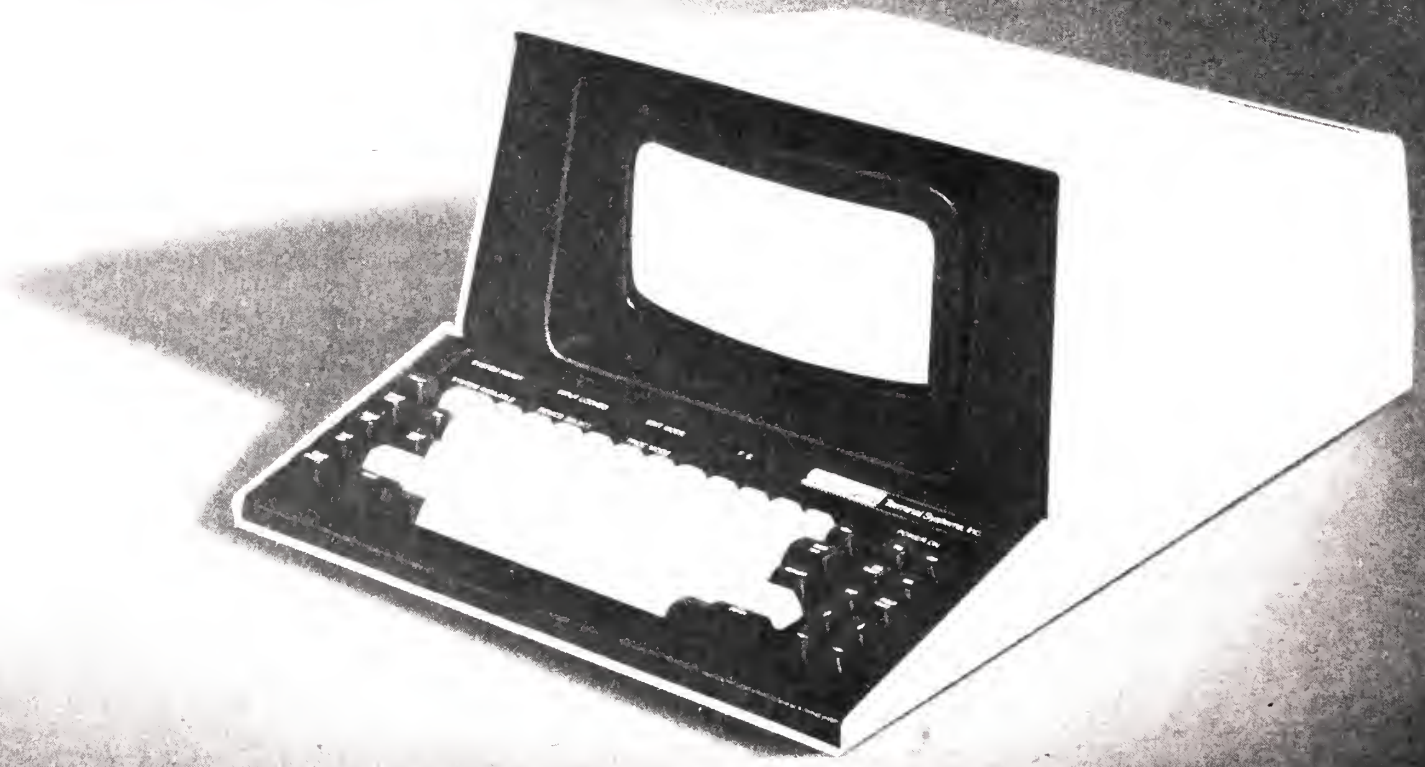

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See us in Booth 203 at the American Bankers Association's National Operations and Automation Conference in Washington, D.C., June 13-16.

Spectron Has Testers For Troubleshooting Network Problems

MOUNT LAUREL, N.J. – Spectron Corp. has introduced two devices designed for troubleshooting data communications network problems.

The Model T-611 high-speed tape unit can record all traffic on both sides of a data link; the programmable Model D-501 Datascope allows data of interest to be captured and displayed on a small CRT screen, Spectron said.

The T-611 tape unit features full-duplex data stream tape recording; acceptance of all codes and line disciplines up to 56 kbit/sec; and compatibility with EIA RS-232C, CCITT V.24 and V.35 and Bell wide-band type 303 interfaces, the company said.

Below communication speeds of 44 bit/sec, the T-611 produces tapes which can be replayed on any Model 601 Datascope. Tapes recorded at any speed can be replayed on the unit with a cable connection to any model Datascope CRT for display, Spectron said.

The unit is said to be compatible with most forms of data transmission, whether synchronous or asynchronous; it also can be left on-line indefinitely – an endless loop format is used even though the tape is not physically arranged as a loop.

Tape speed of the Model T-611 is either 25- or 100-in./sec among four tracks on a 3M Co. DC300A tape cartridge; the two different tape velocities and block lengths are used for recording to accommodate the wide range of transmission speeds, Spectron said.

At speeds above 19.2 kbit/sec, remote connector unit (RCU) can be specified which require signal conversion and connector adaptation, the firm noted.

The price of a basic T-611 is $5,500; additional RCU interfaces are priced between $135 and $650.

The Model D-501 tester is a programmable and portable member of the Datascope family of communications channel diagnostic equipment, Spectron said.

A programming language is said to permit recognition of information patterns in a full-duplex data stream; a 2K-character buffer allows data to be captured and scrolled backward or forward on the 5-in. 375-character CRT screen, the company said.

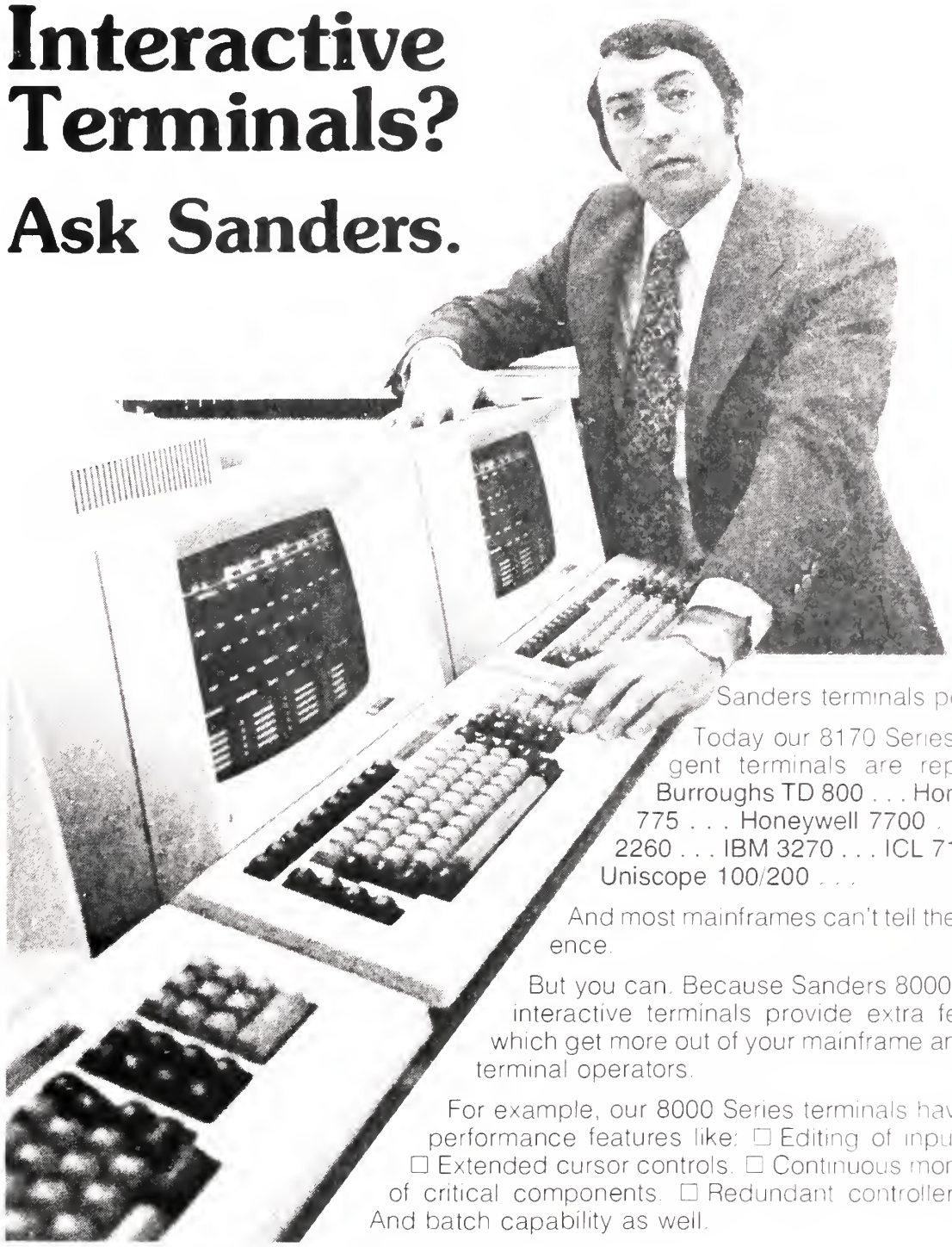
Up to 9,999 events can be counted by a programmed event counter, it added.

The D-501 features compatibility with any speed, any code, synchronous or asynchronous framing, IBM Synchronous Data Link Control, High-Level Data Link Control and 5- to 8-bit characters.

Other features include a full-duplex, time-correlated display with receive leg underlined, up to four alphabets, parity check and simultaneous carrier and request-to-send markers.

The 25-lb D-501 is priced at $9,500, Spectron said from Church Road and Roland Ave., Mount Laurel, N.J. 08057.

Interactive Terminals? Ask Sanders.



Sanders terminals perform.

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KLEINROCK ON COMPUTER NETWORKS

Three 3-Day Seminars

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FROM HIS LATEST TEXT!

An intensive 3-day seminar on Computer Networks will be taught by Leonard Kleinrock this summer. This is the first offering in which his latest authoritative text on computer networks, "Queueing Systems, Vol. II: Computer Applications" (Wiley 1976) will be used.

The basic objective of T. T. I.'s first in-depth seminar is to acquaint the participant with modern techniques of computer network design, both from the analytical as well as from the practical point of view. Topics include packet switching, resource sharing, teleprocessing systems, and network evaluation and design. Experience with an existing international network (the ARPANET) and its operational procedures and pitfalls with their solutions will be presented. Measured performance and the cost-effectiveness of large scale computer networks will be discussed. The new advanced technology of satellite and ground radio packet switching will also be a feature of the seminar. The material presented represents the latest knowledge and experience with modern computer networks and provides fundamental understanding concerning their design, use and impact in the future.

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Seminar fee (+ $48) includes textbook luncheons and refreshments. A $25 discount is allowed if payment is received two weeks prior to the start of the seminar. A group discount of $25 is allowed for each additional paid participant from the same company.

NCR Micro-Based Bank System Modular

WASHINGTON, D.C. NCR has a modular financial terminal system which includes separate keyboards, visual display units, printers and magnetic stripe readers that can be used in any combination.

The NCR 2500 microcomputer-based terminal system can be used to tailor workstations to handle specific types of teller transactions at individual commercial banks and thrift institutions, NCR said.

The NCR 2500 includes

- A microcomputer system which directs and controls the various elements of the system.
- Interactive controllers which handle communications functions between the microcomputer system and the various elements.
- Three types of keyboards 16- and 44-key versions for function and numeric data entry and a 56-key alphanumeric version that can be used for inquiry by name, change of address and other functions requiring both numeric and word input.
- Two visual display units that show numeric and alphanumeric characters as well as special messages for the teller.
- Three printing devices: a basic single-station printer, a three-station printer and a passbook printer.
- Two types of magnetic stripe devices, one which reads magnetic stripe data from plastic cards and a second which can read and write data on the magnetic stripe of a savings passbook or a plastic card.
- An automatic change dispenser.

Up to eight workstations with a mixture of keyboards, displays, printers and magnetic stripe devices can be used with a single microcomputer system, NCR said.

Terminal Transactions

Prices for the basic 48K microcomputer begin at $10,020; monthly rental is $375. Other elements of the system are priced separately, as are the thrift and commercial bank application software packages.

Prices for a typical eight-station system including a numeric function keyboard and display and journal validation printer at each station, plus shared passbook/document printers and alphanumeric keyboards, begin at $7,750 per station, including software. Equivalent rental prices begin at $290/mo per teller station.

NCR 2500 Teller Workstation

Net Optimizes Record Retrieval

(Continued from Page 47)

DEC operating system software, modified by Russell, is used to handle optimized message-switching formats.

Dataflow is using Sycor Model 340 intelligent trminals and Lear Siegler ADM-1 terminals for data entry at local and remote offices, he said.

As work volume increases, the data entry stations will be upgraded in some areas to the larger PDP-11/04s, he added.

Accomplishment of the two primary objectives contributes to cost savings. In one respect, the 24-hour turnaround time for processing DMV records allows Dataflow to offer its customers "the same product faster at a lower rate" or, in other words, "the marketability of faster service," Hewey said.

Another cost cutter is the immediate data validation; some states charge for invalid DMV record requests which is a significant cost item, Wilborn said.

More than 200 terminals will be feeding into the national network from Dataflow's branch offices, larger customers' offices and from six regional centers.

The amount of time when a potentially bad driver is on a policy could involve substantial dollar losses. There are cost-savings reasons and industry competition reasons for a service company like Dataflow to install a communications network, he said.

COMPUTER OUTPUT AMPLIFIED

"Programmers printout. But all our more paperwork."

Problem: the generation gap between what your system generates and what management can handle.

To many a user, a book-length printout isn't exactly light reading. When a report hits his desk, he wants it to be just the information needed in a compact format he understands.

Solution: low-cost graphics and alphanumerics as a plain-speaking management tool.

Now you can bring the new TEKTRONIX 4006-1 Computer Display Terminal into your system for under $3,000. Its graphics and alphanumerics are the affordable answer to keeping words to a minimum and getting the heart of a report right up in plain sight, graphically to-the-point.

The 4631 Hard Copy Unit produces dry, permanent 8-1/2" x 11" copies, and is designed for jam-free operation and flip-top maintenance. Our 4923 Digital Cartridge Tape Recorder puts low cost storage capability right at your side. Interfacing is as simple as a plug-in.

TEKTRONIX

Graphics and the 4006-1 may be the kind of management tool I need. Please have a Sales Engineer call to arrange a demonstration.

Please send me information on the following Tektronix products:

- ☐ 4006-1 Graphic Display Terminal.
- ☐ 4923 Digital Cartridge Tape Recorder.
- ☐ 4631 Hard Copy Unit.
- ☐ PLOT 10 Interactive Graphics Package.

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Company

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My present computer is

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Please send me information on the following Tektronix products:

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- ☐ 4923 Digital Cartridge Tape Recorder.
- ☐ 4631 Hard Copy Unit.
- ☐ PLOT 10 Interactive Graphics Package.

Name

Title

Company

Address

City State Zip

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Disk System Emulates Terminals

MOUNTAIN VIEW, Calif. – Tri-Data Corp. has an RS-232 coupler interface which it said allows its Flexifile 10 floppy disk system to interface with and emulate terminals and modems.

As a modem replacement, the floppy disk system can receive up to 96K bytes on a single disk from a terminal and allows off-line editing, batching and storage until the information is transmitted, the company said.

Once these functions are performed, the system reportedly can be used in place of a terminal to transmit to a modem; continuous transmission of data may take place without operator interruption, the company said.

The interface can handle transmission speeds up to 9,600 bit/sec and is priced at $125. With the Flexifile 10, it costs $1,410, Tri-Data said from 800 Maude Ave., Mountain View, Calif. 94043.

Gandalf Develops Synchronous Data Set

WHEELING, Ill. Gandalf Data, Inc. has developed a synchronous data set for point-to-point or multipoint transmission applications which do not use a centrally clocked digital network.

The LDS 309 does not require dc continuity and complies at all speeds, the company said. At 9,600 bit/sec over 26-guage wire, the LDS 309 can transmit a distance of eight miles.

Standard features include self-testing with an artificial line, circuitry which enables equalization and installation without the use of an oscilloscope.

There are two versions of the data set: a six-speed version ranges in price from $1,800 to $9,600 and a single-speed version costs $786. With an option adding speeds of 14.4- to 19.2 kbit/sec, the single-speed version costs $900.

Delivery takes two weeks from the firm at 190 Shepard Ave., Wheeling Ill 60090.

Prentice Asynchronous Line Driver Increases Data Transmission Rates

PALO ALTO, Calif. Prentice Electronics Corp. has introduced an asynchronous line driver (ALD) which reportedly increases asynchronous data transmission rates and allows users to utilize terminals, CPU ports and data transmission lines to their fullest extent.

The ALD operates over common loaded multiguage cable at transmission rates in excess of 4,800 bit/sec. Over nonloaded cable, the ALD is capable of speeds greater than 9,600 bit/sec, the firm said.

The ALD's transmission distance ranges up to 20 miles. Capable of operating over either two- or four-wire lines, the unit can perform in either half- or full-duplex modes as well as in a polled environment.

The ALD is modular for maximum compatibility with existing dial-up or leased line hardware. It mounts into existing Prentice enclosures, and up to 88 fit into a P-1000 cabinet, Prentice said.

The ALD conforms to Bell specifications and no test equipment or adjustments are required for installation, according to the vendor.

Prices start at $280. Prentice said from 795 San Antonio Road, Palo Alto, Calif. 94303.

CRT From Omron Features Control

SUNNYVALE, Calif. A CRT terminal with an expanded data transmission capability in "protected field" mode has been introduced by Omron Corp. of America's Information Products Division.

The Omron 8025C communications display terminal is a firmware-programmed, microprocessor-controlled CRT designed for stand-alone or on-line data entry, the vendor said.

It will operate in both normal mode and the protected field mode; in the latter, protected areas of a form cannot be altered when variable data is inserted in unprotected "blanks."

Omron has extended the protected field capability of the 8025C by means of "literals transmission," a feature which is said to permit identification of the beginning and end of data fields by transmission of control characters embedded in the protected field.

Literals transmission provides increased flexibility and control of data flow and improves data reliability, Omron said.

Refresh memory is available for storage of 16 to 48 lines (two pages) of data, a total of 3,840 characters. In addition, the terminal will support RS-232-compatible peripheral devices.

The unit is teletypewriter-compatible with transmission rates to 2,400 bit/sec asynchronous in full- or half-duplex mode.

The terminal costs "under $3,000" in OEM quantities, Omron said from 432 Toyama Drive, Sunnyvale, Calif. 94086.

No.1

understand management sees is

The PLOT 10 Interactive Graphing Package includes a library of messages to guide the user along in a highly accessible conversational relationship with the computer.

Add the 4631 copier, and management's got reports by the page, not by the book. One 4631 can be used with up to four 4006-1 terminals for crisp, clear, 8-1/2" x 11" records of 4006-1 graphics and alphanumerics. Together they become a management tool that translates data into usable form without sacrificing manpower for sifting, sorting or hand plotting.

Even our software talks the layman's language.

Our PLOT 10 Interactive Graphing Package quickly puts full graphing capability in the hands of the non-programmer. By using IGP's easy, English-language command structure, the casual user can construct, edit, save, recall and update graphs with professional results.

Our Graphics leadership is part of the whole package. That means proven software. Worldwide service support. Additional peripherals like our 4923 Digital Cartridge Tape Recorder for 200K bytes per cartridge of low-cost, local storage. Plus a price that puts Graphics management easily within reach.

Use the attached reply card, or just reach for the phone and ask your local Tektronix Sales Engineer for a personal 4006-1 demonstration. The more you see from it, the more you'll like it.

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Information Display Group
P.O. Box 500
Beaverton, Oregon 97077
Tektronix Datatek NV
P.O. Box 159, Badhoevedorp
The Netherlands

Get the picture. They'll get the idea.

Hydra Has 800 Line/Min Matrix Printer

MOUNTAIN VIEW, Calif. Hydra Corp. has introduced a communication matrix printer with a "memory management" capability that provides for a short line throughput in excess of 800 line/min. The Model 18 COM printer interfaces to RS-232C, CCITT or current-loop communications lines with speeds from 75- to 9,600 bit/sec.

Asynchronous reception of Ascii, Ebcdic or Baudot is available with memory sizes from 512- to 1K characters.

The Hydra printer is capable of continuously printing short lines at 1,200 bit/sec without requiring transmission of pad or fill characters to allow the printer to accomplish the basic functions of carriage return and line feed, a company spokesman said.

A single block of 1,400 characters of 10-column-width lines can be transmitted to the printer at 1,200 bit/sec, Hydra said.

The communication printer includes a bidirectional high torque lead screw servo drive to allow rapid reversal of the printer carriage; a look-ahead subroutine for the microprocessor to determine what the next mechanical movement of the printer should be, along with a paper advance drive motor to allow for short line performance of over 800 line/min, the company said.

The printer can be custom programmed to provide polling, addressing station select, block checking, code conversion, unattended automatic answering and other features without the addition of hardware, it noted.

The Model B COM printer sells for $3,900 in single quantities, the spokesman said. The price includes the 180 char./sec bidirectional printer with RS-232 or current loop interface, a 512-char. buffer and the microprocessor controller, the spokesman said from 2218 Old Middlefield Way, Mountain View, Calif. 94043.

DON'T INVEST IN A CUSTOM-TAILORED BUSINESS COMPUTER SYSTEM WITHOUT CHECKING THE COST OF DASL.

Like it or not, a successful business computer system must be custom-tailored to the user's requirements. Until now, the initial cost of tailoring a system to your application has been high. All too often, changes or additions to a system have even been more expensive. And many systems just don't have the horsepower to keep pace with a growing business.

DASL is a new approach to business computers from Ball Computer Products. Whether you plan to write the applications programs yourself or turn the job over to a software house, DASL can produce an on-line system unique to your business needs in a fraction of the time required by COBOL, BASIC, or other conventional methods. And your total system costs will be less than half of a batch processing computer such as an IBM system 3.

DASL is a multi-terminal, transaction-oriented business computing system that cuts programming cost by 50% or more. DASL provides most of the software you need—in proven, tested, modular program routines for data entry, validation, computation, data base management, audit trail and report definition. Video display terminals are used to enter source data, make inquiries or request reports—all on a transaction basis. DASL's modular structure allows easy, and rapid changes to programs, data files and reports. If you're a first time computer user it's difficult to define all your requirements before installation. After the system is delivered, you'll think of new applications, report changes and other efficiencies. With conventional languages, modifications can be expensive—or impossible. With DASL, new transaction types may be added without modifying existing ones. And in a fraction of the time you'd expect, because DASL is an efficient shorthand method of defining screen formats, file layouts, and the logical interactions among applications.

Unlike COBOL or BASIC, DASL programs make efficient use of the computer, supporting a high volume of activity with excellent terminal response time. As your applications grow in volume, or as you add new ones—add video terminals and file storage as needed without changing your programs. DASL supports up to 16 terminals in concurrent use, and an unlimited number of independent applications.

Add Ball Computer Products' customer support, documentation and nationwide service, and you get an approach to business computing that you can live with, at a cost you can afford.

If you have programming capability in-house, chances are you can write your own applications using DASL. If not, ask your software consultant or systems supplier about DASL. If you don't have a consultant or systems house, we'll be happy to recommend one. For additional information, send the coupon today. You'll be glad you did.

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Turnkey Features Intelligent CRT, Teleprinter Units

DALLAS – Interactive Systems Technology (IST) has a minicomputer-based turnkey hardware and software system featuring intelligent CRT displays and teleprinters.

The Advanced Interactive Data Entry (Aide) system can reportedly be utilized as a remote terminal system, a remote processing system or a stand-alone business system, IST said.

Aide is said to offer interactive software techniques, including character and field-level editing, referencing of field-processing routines and core-resident reentrant data entry formats.

Remote Aide terminal systems eliminate host transmission of data entry formats, minimize overhead of host computer communications functions and improve line utilization, the company claimed.

Aide also supports simultaneous background remote job entry (RJE) and on-line interactive processing, IST said.

A typical turnkey system consists of a minicomputer with 32K bytes of memory, synchronous and asynchronous communications adapters, a 315K-byte diskette subsystem, four 1,920-character CRT displays with keyboards and a 100 char./sec printer and is priced under $25,000, including Aide software, the company said. IST is located at 4450 Sigma, Suite 135, Dallas, Texas.

Sidereal Unveils ASR Terminal

PORTLAND, Ore. – A four-row keyboard, automatic send/receive (ASR) terminal, the Micro Net, is available from Sidereal Corp.

The terminal is controlled by a microcomputer and can simultaneously access TWX, Telex, Timeshare, DDD satellite, private lines and computers, the company said.

Micro Net can access and communicate directly with other terminals, bypassing code conversion, the firm said. Message preparation is standardized on a Micro Net-created tape, and the terminal produces a printed copy of the taped message, Sidereal said.

Other features include an automatic time/date stamp on all messages sent and received, automatic keyboard dialing and redialing and a mini-buffer mode which allows the user to create a short message in the buffer memory and send it automatically without using tape, the company said.

There is also a built-in, self-diagnostic capability, which allows the operator to isolate difficulties in the terminal, the microprocessor module or on the line, Sidereal added.

Maintenance is available from any Western Union office. There are two models available, the Micro Net 33 and 35. The 33 is priced at $2,970 in quantities of 12, and the price of the 35 varies with the configuration.

Sidereal is at P.O. Box 1042, Portland, Ore. 92707.

Net Copes With Newspaper Ad Increase

By John P. Hebert
Of the CW Staff

RICHMOND, Va. – Two daily newspapers here have computerized their combined classified advertising departments by installing intelligent terminals in an on-line network.

The on-line network has allowed both newspapers, one a morning paper, the other an afternoon edition, to do 20% more work – in the form of 1,000 new classified ads and over 500 maintenance items each day – with existing personnel.

Media General, the communications-corporation and holding company for the *Times Dispatch* and *News Leader*, dismissed the more traditional approaches to classified advertising by installing Sycor 250 intelligent displays.

The IBM-compatible terminals allow each operator to key in classified ad information received by telephone and to verify the information on the terminal's CRT screen.

Operating functions for the 30 CRT terminals include checking to insure all fields are keyed, that numeric data is in the appropriate fields and that range checks are performed on valid numbers.

Data is then transmitted through the communications network – over coaxial cables to a Sycor line controller, intermediary modems and through a Memorex 1270 communications controller to Media General's IBM 360/50 mainframe one block away, a Media General spokesman said.

The computer system reedits the ad data for valid contract numbers and cost-rates each advertisement. This processed data is then returned to the Sycor CRTs where the terminals show how many lines of print are required for each ad and how much it will cost the subscriber.

An advisor can then make whatever alterations are necessary and return the entire screen to the CPU. Once a day the mainframe scans the data base of classifieds and puts them into categories, alphabetic sequence and page number and checks credit ratings.

The data is then output to a 9-track tape drive and hung onto a Harris Fototronic CRT which typesets the information for final printing. Once a month the entire data base is microfiched for audit and historical purposes.

The system has proven particularly useful in "kill," "pickup" and correction situations. Before the system was installed, if someone wanted to kill his ad before the contract time, it would take a person in both billing and classifieds to find the correct advertisement and to stop it as soon as possible.

What often happened, however, was that the classified ran longer than intended or was billed incorrectly. With the data base system resident in the CPU, the operator keys the information in and deletes the file which, in turn, stops the billing cycle. Too many hands were also involved in the pickup or extension of a contract period classified, the user said.

Corrections, likewise, that used to be a cumbersome manual effort, are now searched by contract number, last name or category, and insertions or deletions to the data are keyed in via the terminal's typewriter-like keyboard.

Besides increasing the accuracy of the data and reducing the redundant storage of information, the system has also reduced clerical intervention. Now the advisor who takes the advertisement is responsible for typing it, rating it, billing it and categorizing it – nobody else touches it until it gets into the paper.

The system also allows the generation of reports previously deemed economically unfeasible under manual systems. It produces sales and performance analyses as well as resolicitation reports so that advisors will know when which advertisement has lapsed and allow them to call the individual to resolicit the business.

Sycor Adds 10M Bytes Of Storage to 440

ANN ARBOR, Mich. – Sycor, Inc. has added 10M characters of fixed-disk storage to its 440 clustered terminal processing system.

The system's expanded file capacity of 20M characters is said to allow 440 users twice the storage capacity for file sharing and management and local inquiry/response.

The single-platter, fixed disk contains systems programs, user programs and data files in 512-char. sectors. Spare sectors, automatically assigned and accessed, are also provided as backup to any sector which is found to cause a write error. Seek time, track to track, is 10 msec; maximum, 100 msec; average, 70 msec. Disk speed is 2,400 rev/min.

A four-station 440 system consisting of a 10M-char. disk, 64K bytes of memory, cassette interchange media and communications leases for $816/mo on a three-year lease and $963/mo on a one-year lease, including maintenance. The purchase price of the four-station system is $29,270.

The additional 10M characters of storage adds $194/mo to the three-year lease and $230/mo to the one-year lease, including maintenance. The purchase price of the additional storage is $9,000. Deliveries are expected to begin in December.

Sycor also announced the addition of Cobol to its 440 clustered terminal processing system and two diskettes to its Model 350 intelligent terminal.

The firm is at 100 Phoenix Drive, Ann Arbor, Mich. 48104.

Teleprinter Bows

HOUSTON – Tel-Tex, Inc. has a product entry for the telecommunications industry, a microprocessor-based teleprinter capable of interfacing three separate communications networks.

The Model 300 teletypewriter is capable of 30 char./sec. operation. It operates on the Telex network at 6.6 char./sec., the TWX network at 10 char./sec. and on Bell's Direct Distance Dial (DDD) network at 30 char./sec. speed, Tel-Tex said.

The Model 300 features 4K characters of memory with incremental expansion up to 16K characters.

Prices for the modular teleprinter start at $3,295, five configurations are presently available – Telex, TWX, TWX/DDD, Telex/TWX and Telex/TWX/DDD.

Delivery is in 60 days, Tel-Tex said from 3203 Audley, Houston, Texas 77098.

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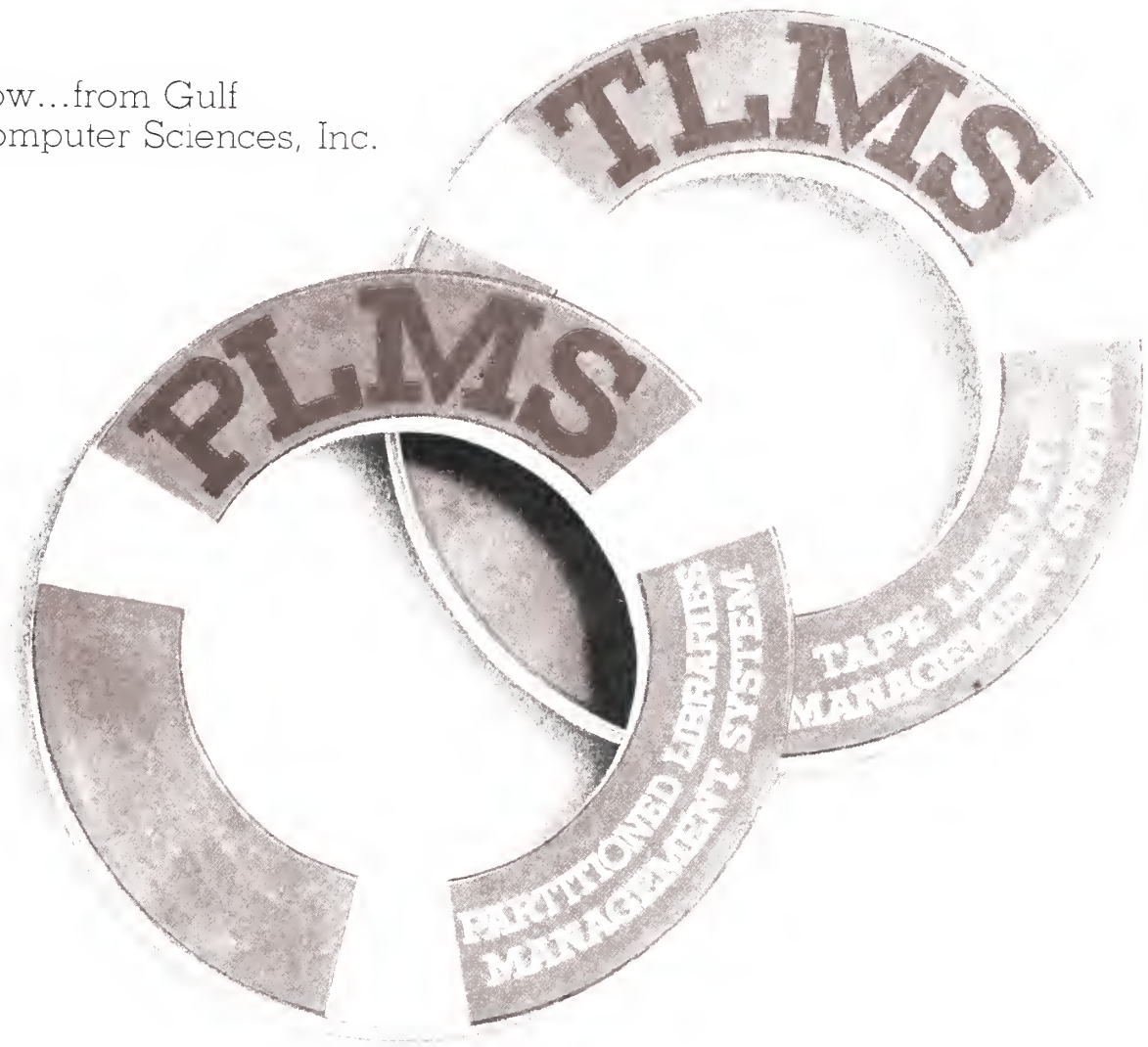

A new product – Partitioned Libraries Management System (PLMS) – joins the highly rated TLMS Package.

Since 1968, TLMS (TAPE LIBRARY MANAGEMENT SYSTEM) has been providing universities, banks, insurance companies, state governments and customers in over 100 medium to very large installations with *complete control* over a data center's tape library.

TLMS is a data capture and reporting system, both online and offline. Online, it can update the master file, provide protection of data sets, provide inquiry and update, and optionally, it can generate external labels for tape output. Offline, it provides reports of library activity, which help to manage the library.

It has proved its ability to provide data security, inventory management, and cost reduction.

Enter PLMS. Now, Gulf Computer Sciences is out with something new . . . PLMS – a series of programs which provide for security control of all partitioned data sets. PLMS provides controlled updating, operational backup and audit reporting of all partitioned data sets — including [illegible] grames.

Both packa[illegible] with OS 360 [illegible] MFT, MVT, MVS, VS2 multiple [illegible] yourself to [illegible]

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ADAPSO

IN?UIRY/ims

An English-like Inquiry Language for IMS or IMS/VS

"...superior capability at a realistic price"

IN?UIRY/ims allows users of IBM's Information Management System (IMS) to easily and efficiently access their data bases. IN?UIRY/ims utilizes an English-like language and operates as a message, message batch, or batch program. The user does not have to know the physical characteristics or the detailed organization of the information stored in the data base.

IN?UIRY/ims is designed for all users regardless of their technical orientation.

ELIMINATES APPLICATION PROGRAMMING. Although IMS's Data Language/One (DL/I) provides the programmer independence from access method, device characteristics and data storage organization, user written programs are still required to retrieve information from a data base. IN?UIRY/ims interprets English-like inquiries and converts them to the code required by DL/I to retrieve user requested information.

ARITHMETIC CALCULATIONS. IN?UIRY/ims provides the capability to perform arithmetic operation on data fields and/or constants and to return the result for action by the verb in the inquiry.

PRE-STORED INQUIRIES AND ARITHMETIC FUNCTIONS. Frequently used or lengthy Inquiries and Functions may be stored in executable form and "called out" via a simple code eliminating the need to physically input the same inquiry or function over and over.

ALL TERMINAL TYPES SUPPORTED. In addition to the IBM 3270 type terminal, all IMS supported terminal types or their equivalent, IBM 2740, IBM 2741, TWX are supported by IN?UIRY/ims.

MULTI-PATH LOGICAL OR PHYSICAL DATA BASES. IN?UIRY/ims can retrieve and logically relate multiple fields from multiple paths in either physical or logical data bases.

ON-LINE AND BATCH SUPPORT. IN?UIRY/ims will operate as a message processing program, as a batch message processing program or as a stand-alone DL/I batch program. IN?UIRY/ims in no way modifies IMS, nor is it any more dependent upon a specific version of IMS than any other IMS user application program.

TSO INTERFACE. IN?UIRY/ims provides an interface against DL/I data bases in the inter-active TSO environment eliminating the requirement for IMS data communications. This interface can be used for both data base diagnostics during program development as well as a production inquiry capability.

OPTIONAL INPUT/OUTPUT. For an on-line inquiry any keyboard terminal can be used. However, IN?UIRY/ims also supports batch mode operation in which inquiries can be made via a terminal or punched cards, and replies are made either to the terminal or a line printer.

TAILORED TO THE USER INSTALLATION. The standard IN?UIRY/ims vocabulary and diagnostic message text may be modified by the individual installation. The vocabulary which contains all words used in the language can be added to or changed for each application area if necessary, and a vocabulary may be created in a language other than English. The diagnostic message text may be expanded or shortened depending upon the installation standards.

DATA FIELD SECURITY AT TERMINAL LEVEL. Access to a data base and the fields within the data base is possible only through the IN?UIRY/ims user dictionary. Since a user dictionary may exist for each terminal user, the absence of the data field definition prevents retrieval of that data element and provides unauthorized access security at the field level.

PERFORMANCE INTEGRITY. In order to minimize IMS overhead IN?UIRY/ims has implemented inquiry page and time limit specifications by IMS logical terminals. This capability allows a user to stop an inquiry after a page and/or time limit and free IMS resources.

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SYSTEMS PERIPHERALS

Advances Continuing Fast Pace

Memory Prices Seen Dropping 40%/Year Until '80

By John P. Hebert
Of the CW Staff

BOSTON – Advances in memory and storage technology are continuing at a fast pace, with price reductions seen by an IBM research scientist at a rate of up to 40% per year until 1980.

Speaking here recently, George C. Feth of IBM's Thomas J. Watson Research Center classified the status of the important memory and storage technologies and projected cost/performance trends of MOS random-access memory (RAM), charge-coupled devices (CCD), magnetic bubble devices, electron beam-accessed MOS (Ebam) storage and moving-head disk file technologies for the next four years.

Feth said 4K-bit MOS RAM chip prices have fallen to less than .2 cent/bit with lower performance versions available for about .11 cent/bit, while 16K-bit CCD chips are available and prices are projected to be a fraction of MOS RAM price per bit, with a 64K-bit chip in development.

Additionally, 1K bipolar RAM chip prices have decreased to about 1.5 cent/bit, he said, adding that a CCD store with 128K-byte capacity of the basic 8-bit or 9-bit byte module has been introduced, with a selling price of about .25 cent/bit for the module or about .3 cent/bit including controls and buffering.

Moving-head disk files now sell for a little over 1 mcent/bit in large-capacity systems, he noted.

Feth gave a rundown on the present state of memories in large computing systems today and noted "MOS RAM, especially using the 4K-bit chips, is being chosen over core for the majority of applications; it offers overall advantages in price, performance, flexibility and powering and can be designed to be upgraded straight-forwardly when 16K-bit chips become available.

"While price and access time are not the only important characteristics of a store . . . they do provide a convenient and meaningful way to characterize the various technologies," he explained.

"Fixed-head files constitute a major deviation from these characteristic price/performance lines," he said.

"Options which include fixed-head disks within the moving-head disk files have been offered this makes possible a larger access rate.

"It is particularly practical where the indices for the stored data are also recorded in the disk file, in this case under the fixed heads' tracks and access to one or more index records for each random address can be obtained without incurring the track-seeking delay time of the moving-head file."

Serial Storage

"Several storage technologies wherein the stored data is accessed sequentially rather than randomly, but which do not involve mechanical motion, are receiving a great deal of attention and have advanced recently to the prototype or initial product introduction stages," Feth said.

Included in this category are CCDs, magnetic bubble and domain tip (DOT) and Ebam memory technologies, he said.

"The projected characteristics which make these technologies of high practical interest are their fast access compared with the mechanical storage and their relatively modest price compared with RAM.

"The improvements in these characteristics, as well as other potentially attractive features . . . open quite a range of potential application areas.

"Three major approaches to bubble stores are being investigated: the permalloy-bar file (PBF), the contiguous-disk file (CDF) and the bubble-lattice file (BLF).

"The major potential advantages of bubbles are their anticipated extremely high density, relatively few processing steps and nonvolatility. The PBF approach has received the most attention," Feth added.

The CDF approach could lead to larger densities, he noted, however.

"While the BLF approach promises high density and some advantages in insensitivity to unwanted nucleation of bubbles, it requires many (about seven) mask steps. Both the CDF and BLF are too new to fully assess their potential at this time," Feth noted.

On the other hand, "CCD storage has many attractive features and is quite flex-

(Continued on Page 58)

Storage Added to Two 370s

WHITE PLAINS, N.Y. – Following hard on the heels of IBM's memory price reductions for larger systems [CW, May 24], the firm has announced increased memory sizes for the 370/115-2 and 370/125-2 systems.

With the increases, the 115 can now have 50% more memory than before, while the increase for the 125 will allow users to double their present memory on the systems, IBM indicated.

The 370/115-2 is now available with a maximum main memory of 384K characters, up 50% over the previous maximum mandated by IBM. The 370/125-2 is now available in two additional memory sizes of 384K and 512K characters – the latter double the former 256K maximum for the unit.

Monthly rental for the 115-2 with 384K is $6,660 while previously the rental price was $5,600 for a unit with 256K of memory. Purchase price is $220,250 compared with the earlier $192,650.

Previously the top of the 125-2 line sold for $254,050 and rented for $7,155/mo. The units have a rental of $8,215/mo for 384K and $9,115 for the 512K unit. Purchase prices are $281,650 and $303,250 respectively.

Currently installed models can be upgraded to the new versions at the user site. First shipments of the 370/115-2 will be in the first quarter of 1977, while shipments for the 125-2 will begin in this year's fourth quarter.

Two More Printer Alternatives Available to Users

• Diablo Releases 200 Char./Sec Device

HAYWARD, Calif. – Diablo Systems, Inc. has announced a 200 char./sec matrix printer that utilizes servo technology to permit high-speed vertical and horizontal tabbing and bidirectional printing.

The Model 2300 matrix printer head can be accelerated to printing speed and stopped – within one print position – Diablo said.

With a 9 by 7 dot matrix that permits descenders to go below the print line, the user can print both upper- and lower-case characters, the company said. Cartridge-type ribbons are used.

The head's ballistic design permits the wire strikers to be in free flight, thereby eliminating field head adjustments, the company said. Adjustments for paper thickness that ranges from one- to six-part can be made by an operator.

The unit also features a low-heat-dissipation head to minimize overheating, the company said.

The printer is microprocessor-controlled, increasing the printer's logic flexibility and permitting implementation of more operating features.

The 2300 is compatible with the Diablo Hytype serial printer, and both use the same die-cast aluminum frame and have some spare parts compatibility, giving OEM customers single-vendor advantage for both daisy wheel and matrix printer requirements, the company said.

The 2300 is priced at approximately $2,400 for one and about $2,000 in OEM quantities of 100 from the firm at 24500 Industrial Blvd., Hayward, Calif. 94545.

• Univac Unit Unveiled For 90/30s, 1100s

BLUE BELL, Pa. – The Univac 0776 impact printer subsystem has been introduced for 90/30 system users under OS/3 and 1100 systems users supported by OS.

The 0776 system attaches to the 90/30 via the multiplexer channel and to the 1100 system via MSA or C/SP, Univac said.

The Univac 0776 printer offers a choice of two line speeds in the mid-price range. The lower speed model operates at 760 line/min while the faster unit operates at 940 line/min. Both models have a 48-character set, although operator-changeable cartridges are available ranging from 24 to 384 characters, the company said.

Noise levels are said to have been reduced to comply with standards set by the Department of Labor's Occupational Safety and Health Administration.

Checking facilities, including as basic functions, include parity check, invalid command check, buffer load check, vertical format code buffer check, form check, type speed check and print actuator check, the company said.

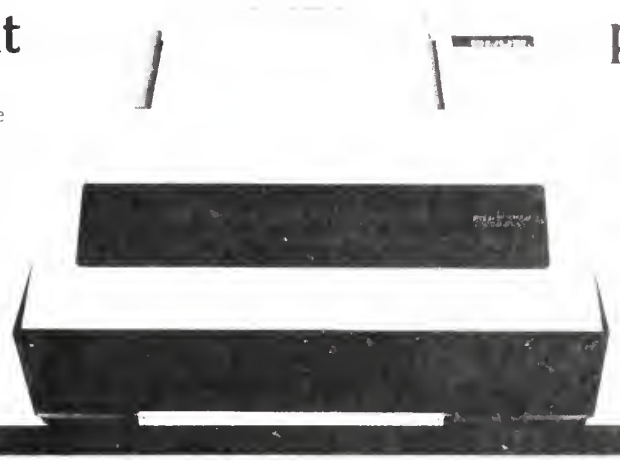
Handles Multipart Forms

Model 0776-00, the 760 line/min model, rents for $1,050/mo including maintenance. The purchase price is $40,800.

Model 0776-02, the 940 line/min model, rents for $1,200/mo including maintenance. Purchase price is $46,080.

The printers will be available after Oct. 1 from Univac at P.O. Box 500, Blue Bell, Pa. 19422.

The printer that



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The facts will speak for themselves.

Qantel presently markets five systems: Models 800, 900, 950, 1200 and the new 1300.

The starting price is $22,500. Even the smallest standard configurations contains 32K bytes of main memory, six million bytes of fixed and removable disc storage, and a 45 characters-per-second typewriter terminal.

At the other extreme, main memory is expandable to 128K bytes, and disc storage is expandable to 640 million bytes. And the 1300 can support up to 40 video terminal operator stations. Even the most demanding print requirements can be satisfied by up to two 600 lines-per-minute printers.

Qantel systems provide up to 13 I/O channels, up to nine of which are direct memory access channels with data rates up to 900 KB. Data communications, both synchronous and asynchronous at data rates up to 50 Kilobaud, are easily handled by a specially designed, independently functioning mini-computer on a controller. Most non-DMA device controllers are fully buffered, permitting minimum system involvement with I/O, and maximum performance.

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Scientist Predicts Prices of Memory To Drop Until 1980

(Continued from Page 57)

ible. Sensing and other supporting functions are easily accomplished by means of MOS devices on the same chip and utilizing the same technology.

"In the future, the cost of CCDs is expected to be a fraction of that of MOS RAMs for a given level of technology capability. Improvement by a factor of from 2 to 10 times appears quite probable," he said.

"Anticipated advantages of Ebam technology have to do largely with the use of the electron beam, the density possible from the very narrow beam with diameter of the order of a micron, the deflection speed of the beam, the gain inherent in the generation of many carriers per electron in the beam.

"On the other hand, the cost of the tube and electronics is substantial and therefore the designs involve large capacity, in order to obtain attractive price per bit," he said.

The price of a minimum system with "modular size on the order of 10^8 bits is large compared with that for the CCD and bubbles, where module capacity of the order of 10^6 bits seems economical," he said.

First deliveries of the Ebam systems are scheduled for the last half of this year, he said.

"These include a 10^8-bit multitube system at a price of a little over .1 cent/bit to the end user. In the future, tubes of 10^8-bit and 10^9-bit capacity using two-stage deflection and multitube systems with 2 by 10^9 bits are projected at prices well below 10 mcent/bit.

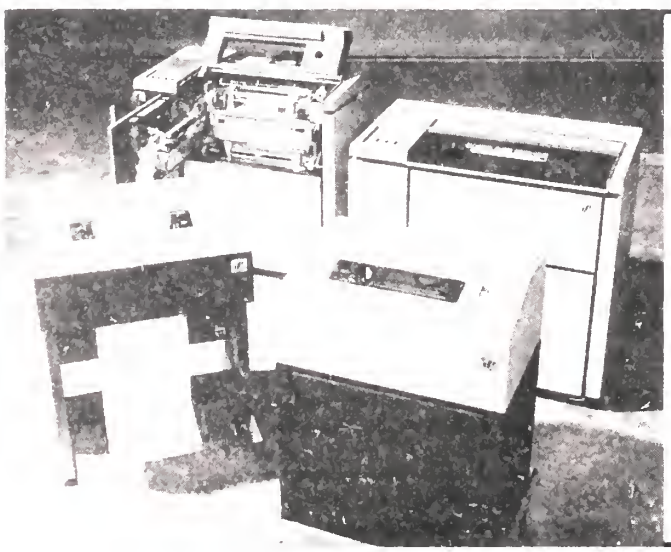
"It is apparent that even today, CCD's and Ebam's price/bit and performance characteristics are quite competitive with the high-performance fixed-head disks," Feth said.

"Only small improvements in price will be needed to make CCDs and bubbles competitive with flexible disks (when the price of the disk's controller is included, as in its upper price extreme); Ebam's would not be competitive with flexible disks because of the large price of the minimum Ebam module.

"Josephson-junction technology, while still very speculative, offers potential for future high-performance logic and memory. Memory devices have been described and studies have been performed for a nondestructive-read memory with about a 2-nsec cycle time and for a destructive-read memory about 1/10 as fast.

The process of evolution will be at work to provide improvements in nearly all technologies, Feth said, and cited the price trends over the past few years for semiconductor RAMs, which have decreased at a rate of about 35% to 40% each year.

"It is not clear whether these trends can continue at the same rate," he noted.



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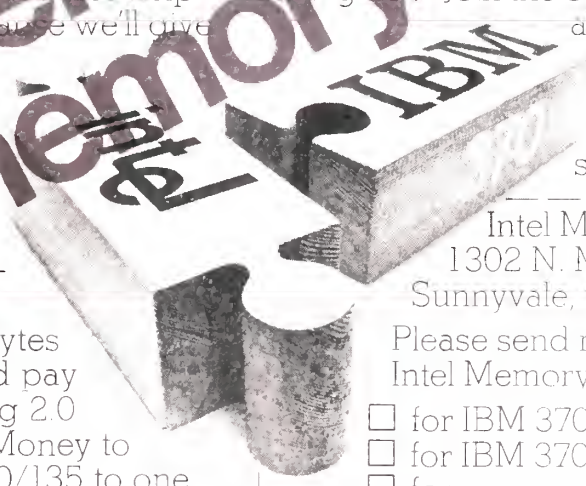

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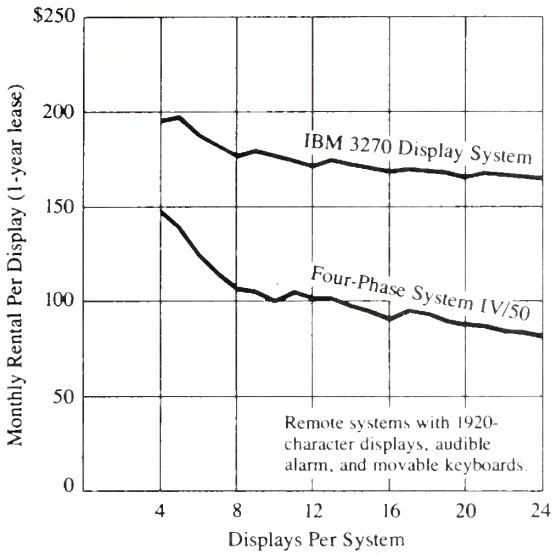

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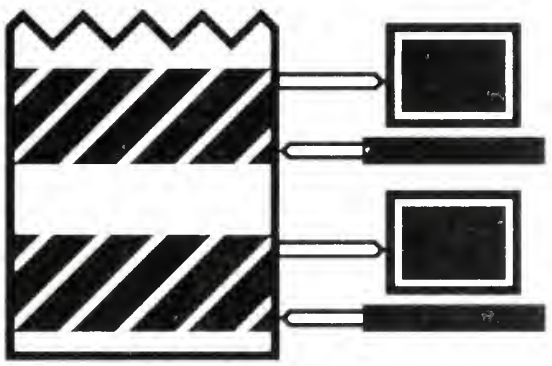

Operator displays serve as windows into System IV/50 memory where screen data is stored. Data in these areas is displayed automatically and can be manipulated directly by COBOL procedure statements *without I/O transfers*.

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As a result, format development, test, and modification are program independent.

Choose the optimum balance of central and local processing for each of your applications.

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At one end of the spectrum NTP/100 simulates the IBM 3270 with all transaction processing performed by the central mainframe.

At the other end of the spectrum NTP/200 supports stand-alone COBOL applications with all transaction processing performed by System IV/50.

Other NTP systems combine COBOL transaction processing with concurrent inquiry or batch communications.

Enhanced 3270 Simulator. NTP/100 provides all 3270 keyboard functions and editing features—plus local format storage for improved display response, a Store-and-Forward Mode for backup, and built in diagnostics to pinpoint network troubles quickly.

2780/3780 Simulator. NTP/130 is a programmable remote batch system that features disc spooling.

Programmable 3270 Simulator. With NTP/150 you get all the features of NTP/100—plus COBOL programming for custom enhancements. Use it to edit keyboard entries at the source, validate data against local system files, integrate data from these files with keyed entries for transmission . . . or with received data for display or printout, and to spool print files for increased operating flexibility.

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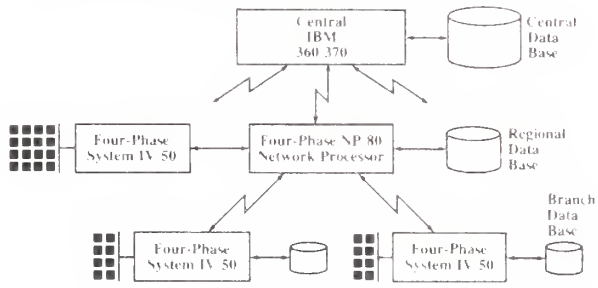

The heart of the NP/80 is a powerful computer with up to 256K bytes of LSI memory—*the first in the industry with 16K-bit RAM's.*

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Off-Site Storage Facility Can Prevent Catastrophes

By Belden Menkus
Special to Computerworld

• When the Arizona State Finance Center in Phoenix discovered in December 1971 that one of its tape files had disappeared, it tried to reconstruct the file from punch cards. To its dismay, it learned that 2,000 of the cards had just been destroyed — folded, gilded and used as Christmas decorations.

• Several days before it was due to receive a fire-prevention award in July 1973, the U.S. Military Personnel Records Center at Overland, Mo., was hit by a fire that knocked out part of a DP center. Along with it went most of the records for World War I veterans.

To DP managers, incidents like these read like horror stories. They are not isolated examples, however, and they're occurring today with increasing frequency as information storage is centralized.

There is a good cause for horror — reconstructing files can be extraordinarily difficult and time-consuming or, in other words, expensive.

It's been estimated, for example, that its costs $25 to enter a name and related information on a credit-card list. Since a tape may contain as many as 15,000 of these entries, the expense of putting Humpty-Dumpty back together again may reach $375,000.

Casualties like the gilded punch cards and the Overland fire are pushing jittery management at large and small companies alike into audits of their computer security systems. The focus is on data, not hardware.

Many firms also are opting to keep a set of duplicate tapes and disks at off-site locations. An extra goad spurring use of these off-site locations is the increasing federal requirements for corporate retention of records; it's becoming impractical to retain all that data in-house for years on end.

Establishment and perpetuation of an effective information security system is a new and unfamiliar responsibility for corporate management. But as the above cases illustrate, the most valuable assets of many companies aren't plant and equipment or even inventories of raw material or finished goods.

Life Blood

Instead, they are the collection of magnetic tapes and disk files used by their DP facilities. These contain the data base and transaction information that are the lifeblood of the organization and assure that the business functions effectively and efficiently in a competitive environment.

Companies are seeking outside assistance and support services to help discharge management's responsibility for data security. A review of the outside services available turns up several companies geared to provide them.

One of these, headquartered in New York City, is Bonded Services. It has established what is believed to the first off-premises facility designed to safeguard DP magnetic media, developed an integrated system for providing information security and created an information system security audit.

Bonded Services specializes in information security as well as in retention, handling and worldwide distribution of all types of data records. These range from computer tapes and disks to video tapes and motion picture film, all kept at its principal facility — a 4-1/2-acre security complex in Ft. Lee, N.J., just across the Hudson River from New York City [CW, Feb. 16].

Trading Tornadoes for Earthquakes

What about on-site retention compared with such an outside service? Upon initially considering the problem, corporate management may conclude files can be suitably protected in-house.

The problem here is that the tape library — where current operating files are kept — fails to provide a suitably secure physical environment or the requisite access control. Additionally, if a disaster occurs, both master and backup files would be destroyed.

Some organizations have considered the routine exchange of selected files of tapes and disks with neighboring companies or with distant subsidiaires. But this approach fails to solve the inherent objecti — ensuring the security of a vital corporate asset.

Rather, it lessens management's control over the files and merely shifts the locus of vulnerability. Moving tapes from headquarters in Kansas to a subsidiary in San Francisco exchanges the risk of tornadoes for that of earthquakes.

Corporate management's use of off-site security facilities is an important element in a company's information asset protection plan. This plan should be designed to assure the prompt and complete restoration of an organization's critical DP activities after a disaster.

How is such a plan created? What operating files are duplicated for retention off-site and what archival files are to be bundled up and removed without leaving behind any duplicates?

The Key to establishing this plan is the decision to undertake a wide-ranging security audit that examines critical DP activities and the requirements for maintaining data on-site. One result of the survey is a listing of files that contain essential information, plus a second listing of which of them are so vital they must be kept in-house and duplicates made.

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CRU Devices Signal Failures by Alarm

CLEVELAND — CRU, a manufacturer of computer performance measurement hardware, has announced a line of digital devices that sound an alarm if any portion of a user's system fails to function.

The Sentry/360 alarm systems, designed for use on any manufacturer's hardware, were described by the company as the DP manager's equivalent to the railroader's dead-man switch.

Using digital logic, two or three probes and some software patches, the box collects a signal from the CPU, channel, frontend or whatever it is monitoring.

The Sentry/360 can be used to oversee any portion of a system, including the address/compare sync pulse, the digital equipment trace bit and console indicating lights, according to the vendor.

The alarm systems are priced at $1,000 to $3,000 from CRU at 4650 W. 160th St., Cleveland, Ohio 44135.

Manager Initially 'Scared Stiff'

S&L Finds Move to Disk-Oriented System Saves Time

UPPER DARBY, Pa. – Tony Crane wears many hats at Greater Delaware Valley Savings & Loan (S/I) Association here.

Officially, he's an assistant vice-president. More precisely, he's in charge of all DP systems and services for the five-branch S&L.

And, in addition to being DP manager, he's assistant treasurer, manager of systems analysis and computer programmer.

Crane is currently training his assistants to work with the S&L's recently installed Univac 90/30 system with an able assist from Univac's John Doughten – a systems analyst who's there to help with the conversion to disk operation.

Together Crane and Doughten have been converting the S&L's operations to disks from the Univac 9200 system and unit record equipment previously used.

The disk-oriented system's speed is the main factor in processing at Greater Delaware. "Sorting 700 transactions takes 1 min," Crane explained. "We sorted a large file of approximately 50,000 records, and it took around 15 min."

'Scared Stiff' About Disks

Crane feels confident about the system now, but he didn't always feel that way. Like many people using DP for the first time, he had reservations: "I never worked on a disk system before," he said, "and I have to admit I was scared stiff.

"With cards, you could pick them up and look at the numbers. Since the disk is magnetic, you can't see the information on it."

The present installation at Greater Delaware's main office here services all accounts for the main office and four branches.

Soon to be added to the complex are two more branches obtained since a merger with another S&L association. Even with all of these growing pains, Crane said he is confident the disk-oriented system can handle the increased workload.

The basic system at Greater Delaware consists of the Univac 90/30 processor, which has 32K bytes of main memory; a card reader which handles 500 card/min; a card punch with an output of 75- to 175 card/min; a line printer with a speed of 400 line/min in alphanumeric mode; and two 8416 disk drives. With both drives operating, disk capacity is about 59M bytes. Also on-line is a Uniscope 100, which is used instead of a teleprinter.

Pleased With Speed

Crane said he is pleased with the speed of the disk system. When he made inquiries at other computer sites, he was told a copy pack was very time-consuming, requiring some 25- to 45 min to run a security file copy.

"We're able to run a copy pack in 3 min," Crane claimed. "Running a copy pack in 3 min – well, that's just fantastic."

Speaking of another speed feature, Crane noted Greater Delaware compounds interest on every account on a daily basis; this daily updating and compounding can be handled in a 3-min pass, he said.

Since the system is still new to Greater Delaware, it hasn't yet been loaded with all the S&L's work. Passbook savings are all being handled by the computer. Next will come the club accounts, but mortgages and loans will take a while.

The mortgages are still being handled by an outside computer service, but nevertheless remain a high priority for conversion, Crane said.

Right now, the system is handling directly some 35,000 passbook accounts and 4,500 certificate accounts. Club accounts – 1,800 Christmas and 300 Vacation Clubs – are run in emulation on the 90/30 in card mode using a Univac 9300 system program.

"The emulation of the card system is working well," Crane said. "The only thing I don't like about emulation is that it's slower – maybe 75% of the speed of the 9200."

The 9200 card system was installed in 1970 and Greater Delaware used it until May of this year.

Each branch receives an updated trial printout once a week. The tellers are required to verify the trial balances during a window transaction.

"Tellers should verify the balance on all withdrawals," Crane stated. "They don't always do this – especially during the crush of a busy period and when the teller knows the depositor."

But once the S&L installs terminals in all of its branches with on-line processing, this type of verification will be easier, Crane said.

But "that's about three years away," he added. He expects the branch offices will be equipped with Uniscope 100 terminals.

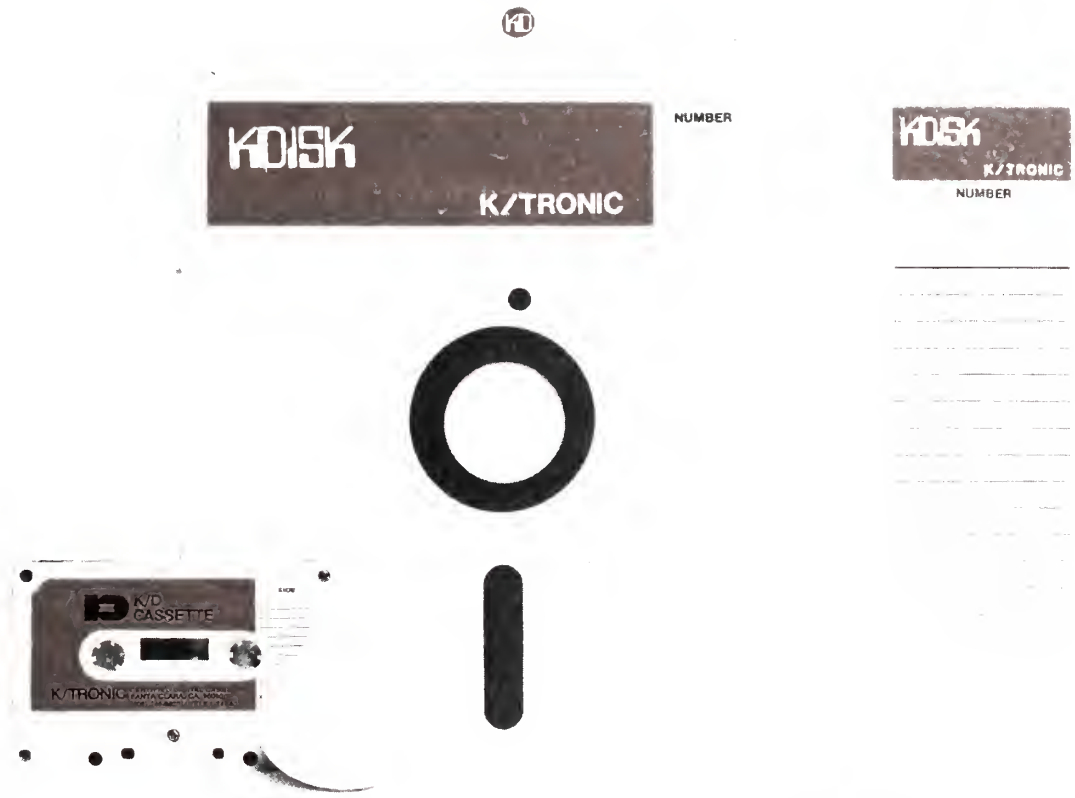
The trial balance – which is used now at the branches – lists the account number, the balance, the last transaction, the last transaction date and the accrued interest to that time. While tellers aren't usually required to check the printout for deposits, they are expected to do so at certain times of the year so interest earned can be credited in the passbook.

The greatest single source of errors is when tellers don't add interest to passbooks, Crane said. This type of error is picked up on the daily audit and notices are sent out to depositors so they can bring their passbooks into their branch for updating.

Other errors can include such items as a returned check not entered in the passbook or a deposit made without the passbook, he observed.

There are two types of loans at the S&L – savings account (passbook) loans and mortgage loans. The 4,000 mortgages are currently processed by each bank's DP system, but eventually will be pulled into Greater Delaware's computer system.

This will happen by January 1977; it will take that long because of prior commitments. Crane and his associates are now setting up the programs that will be used for this group of accounts when they're entered into the 90/30.



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Time-Sharing Center Aids Study of Nuclear Power

LIVERMORE, Calif. — A time-shared national computing center at Lawrence Livermore Laboratory here has been established to speed research in development of electrical power reactors fueled by the nuclear fusion process.

Lawrence Livermore Laboratory is operated by the University of California under contract to the Energy Research and Development Administration (Erda).

The computer network is anchored by a Control Data Corp. Cyber 76 system, with a CDC Cyber 70, Model 73 system utilized as a front end. These are connected by high-speed communications lines to four remote user service centers, with more to follow.

Last year the laboratory was designated by Erda as the site of a national controlled thermonuclear research (CTR) computing center to provide most of the computing support for the theoretical, experimental and engineering activities of the controlled fusion program.

The center will perform numerical simulation of experiments intended to provide better understanding of the complex plasma interactions which occur during controlled thermonuclear experiments.

Results of these simulations will be used as the basis for further calculations in fusion plasma physics and in the design of experimental reactors.

The CTR program is aimed at generating controlled fusion reactions by producing and magnetically confining high-temperature, fully ionized plasmas of heavy isotopes of hydrogen. Controlled thermonuclear fusion is now widely accepted as one of the best prospects for a clean and safe supply of energy in the future.

Commercially available power generated by controlled fusion is at least 20 years away, but an experimental fusion power reactor generating about 100 megawatts of power is expected to be operable about 1985, according to Dr. John Killeen, head of the national CTR center.

Both Russia and Japan are aggressively pushing fusion programs, and both may very well have their experimental reactors operating some time before that of the U.S. The Russians are known to be devoting twice the U.S. resources to their program and are expected to have a commercial-scale, 500-megawatt demonstration plant in operation about 1995.

Once electrical energy from fusion power is available, the need for fossil fuels will diminish tremendously, because, Killeen said, "theoretically, a gallon of sea water contains the energy equivalent of 320 gallons of gasoline."

Enormous Computing Power

Erda scientists at Livermore said equations describing the behavior of plasma in CTR devices are so complex that they can only be approximately solved by analytical techniques presently available. Therefore, computer models must be used extensively to understand and predict plasma behavior.

While the results obtained to date have been of great importance in furthering the program, the computer codes still need extensive development and refinement in order to model realistic confinement plasmas, the scientists said.

Presently, good one-dimensional codes are available to follow different plasma qualities on different time scales. Idealized two-dimensional codes are now in the application stages, Erda said, and crude three-dimensional codes are in various states of development.

It is the need to develop these codes and others like them that brought the national CTR computing center into existence.

Small-, Large-Scale Systems

Small- and large-scale computers coexist in the distributive network, which is designed so that large jobs can be channeled to the big machines, and smaller jobs — a printing chore, for example — can be handled by a small computer at a remote user site.

The smaller facilities accomplish much of the locally required processing, relying on the large central computers for work such as large particle simulation and fluid calculations.

The network is so designed that when a small remote computer cannot complete a calculation, it automatically calls upon the Cyber at Livermore.

First to go on-line with the CTR center have been three major laboratories and one private contractor: Oak Ridge National Laboratory in Tennessee, Los Alamos Scientific Laboratory in New Mexico, Plasma Physics Laboratory at Princeton University and Gulf General Atomic in La Jolla, Calif.

Two laboratories at Livermore are served by the computing center — one used by the scientists engaged in controlled thermonuclear research and one that provides operational access by the CTR computer center personnel. Other remote installations are due to follow.

The Cyber 76 computer provides the main computing power and the Cyber 73 system handles the communications load, acts as a file transport between remote sites and manages the large centralized data base.

Each of the remote user service centers utilizes a Digital Equipment Corp. Decsystem-10 computer to provide local computational support and to communicate over 50 kbit lines with the Livermore center through a DEC PDP-11 computer and a complement of I/O devices.

Terminals at the remote user sites and the host laboratory include a mix of 30 char./sec electrostatic printers, interactive CRTs with alphanumeric keyboard and graphic/alphanumeric displays operating at 9,600 bit/sec.

User-Created Files

Files, stored under a Livermore-developed program called Filem, are user-created. These files are managed by the CDC Cyber 73 computer and are retained on disk and then purged to tape after a predetermined period of nonuse. The Cyber 73 maintains an index, and a request for a purged file brings the data back on to CDC 844 disks. A mass memory, planned for later this year, will replace the tapes to some extent, but tapes will remain as backup.

The data communications portion of the network is controlled by a DEC PDP-11 used as a concentrator. File transport and terminal traffic flows site-to-site through this network. Communication with the Cyber 76 computer can also be handled by direct dial to a concentrator at Livermore.

A growing number of universities are receiving funding by Erda for fusion research, and private contractors are expected to enter the program as feasibility becomes further established. These new participants, as well as a number of university laboratories presently in the program, will be served by the network.

While terming the new computing center a tremendous help in hastening the day of practical fusion power, scientists at Erda pointed out that the more they learn about the behavior of plasmas, the more computing power they will need.

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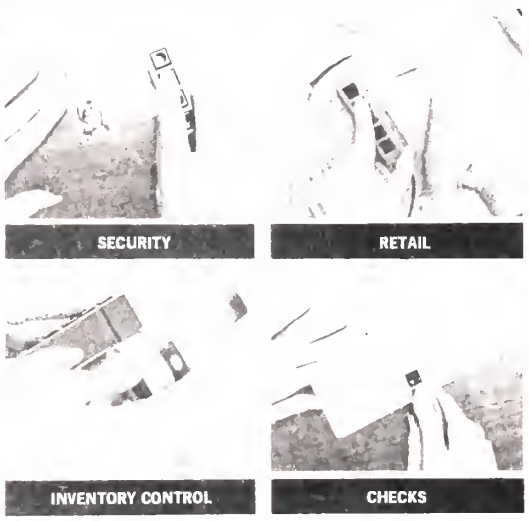

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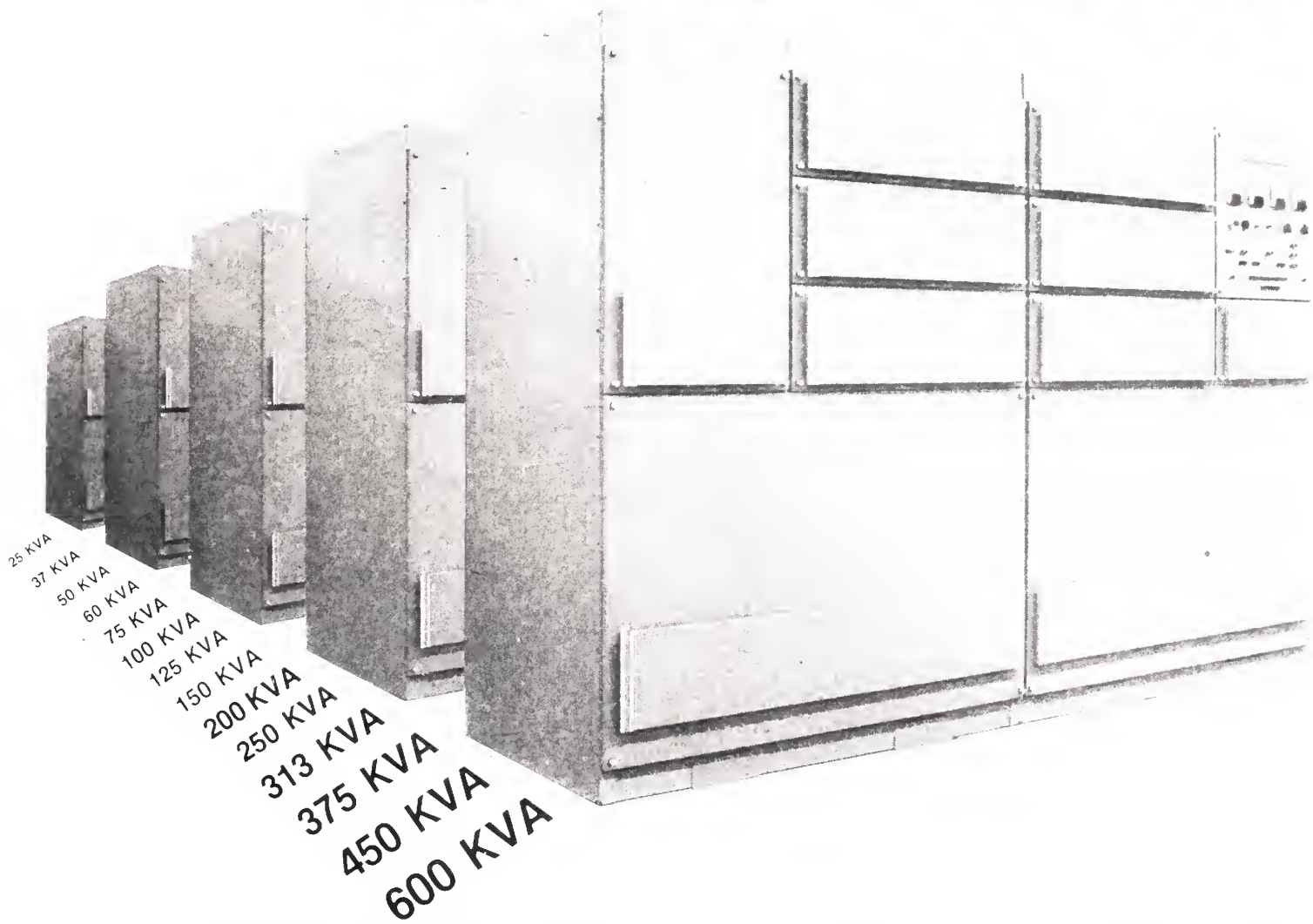
The UPSables for '76



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'Security Kernel' Developed to Help DP Keep Secrets

BEDFORD, Mass. — A package smaller than the proverbial bread box, called a "security kernel," may solve a perplexing problem that faces computer users — how to keep a secret.

The Electronic Systems Division (ESD) of the Air Force Systems Command and the Mitre Corp. here have developed this security kernel, which is a combination of hardware and software that controls access to information within a computer.

The kernel prototype has been running at Mitre for more than a year.

According to Lt. Paul Karger, systems design engineer in ESD's Computer Security Branch, "a key factor of the kernel is its ability to control release of information by effectively ensuring that a user's clearance is adequate for the information requested.

"Security checks in current computer systems are dispersed throughout the system, making it virtually impossible for its security to be guaranteed," he said.

"However, in a system with a security kernel, security functions are centralized and isolated, so it's possible to prove that it is penetration-proof."

Because there are "no effective automatic internal security controls" in today's computers, Karger continued, "the military is forced to protect information in computers by physical and procedural means — for example, by processing only one security level. Computer systems may be changed from 'secret' to 'top secret,' but only after going through time-consuming clearing operations.

"These procedures result in inefficient use of equipment and manpower and the separation of various classifications of information often requires the purchase of more computer hardware than is necessary," he added.

Grim History

The history of computer security is grim, Karger said, and keeping secrets in computer systems is recognized as a major problem by both industry and the military.

Numerous instances of successful tamperings or breaking of computer security programs have been recorded. Some of these have been made by an ESD "tiger team" composed of officers from the Computer Security Branch of the Deputy for Command and Management Systems and Mitre computer experts.

The team has broken several computer systems, including the Honeywell Multics which was initially highly publicized as "secure," Karger said.

But penetration exercises only show the existence of vulnerabilities in a system and do not confirm its security. Even though a weak spot may not yet have been discovered, further attempts could find one, he added.

In 1971 ESD was given the problem of developing a multilevel computer system, i.e., one that could simultaneously process two or more levels of classified information, from "unclassified" through "top secret," for users with different clearances. The system had to be certified secure for Air Force use.

To accomplish this task, ESD contracted with Honeywell Corp. to develop the technology needed to secure computer systems and to meet the strict validation requirements of the Department of Defense.

Based on its studies of the Mitre security kernel, Honeywell is developing a security kernel for a large Multics general-purpose computer which allows immediate information sharing. Prototype testing of the secure Multics computer is planned at the Air Force Data Services Center in Washington, D.C., in 1979.

ESD is also sponsoring with Honeywell the development of a secure military minicomputer. Potential applications of secure minicomputers as components of Air Force systems include such systems as the Strategic Air Command Total Information Network, the Air Force Satellite Communications and E-4 (airborne command post).

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MSI Line Printer Produces Labels

COSTA MESA, Calif. — MSI Data Corp. has introduced a medium-speed line printer for printing alphanumeric data and the MSI Bar Code on shelf labels, merchandise tags or other forms.

The Model 3150 does not, however, print the Universal Product Code, a company spokesman noted.

Designed to be controlled by an MSI Data System IV receiver, the printer works off-line and is aimed at the user who wants to save money by generating bar code labels in-house, the company said.

For the user that already has a Data System IV, the printer costs $13,200. The printer with the tape drive costs $35,000.

The Model 3150 will be available in July from the firm at 340 Fischer Ave., Costa Mesa, Calif. 92627.

Single Bus Marks Design Departure

Harris Unveiling Slash 6 for High-Performance Users

By Esther Surden
Of the CW Staff

NEW YORK – The Harris Corp. Slash 6 minicomputer being unveiled at the National Computer Conference (NCC) here this week was designed for high-performance, real-time applications, the vendor said.

Featuring a single-bus design and microprogrammed architecture, the system represents a different hardware approach for the firm, a spokesman said.

Incorporating a 4-bit microprocessor and MOS memory, the Slash 6 is said to be fully software-compatible with the other members of the Harris Slash series. It will eventually replace the Slash 4 system, according to the spokesman.

With the Slash 6, Harris has increased the effectiveness of the Slash 4's I/O structure by implementing a block-oriented direct to memory I/O operation for high-speed devices, the spokesman said.

An 8-bit programmed I/O channel is available for slow-speed character-oriented devices, he added.

System Size Reduced

The system CPU, which incorporates six 4-bit bipolar microprocessor chips, a programmable read-only memory (Prom) bootstrap and eight priority interrupts, is packaged on a single multilayer printed circuit board, the firm said.

This has significantly reduced the Slash 6's size compared with the Slash 4, which uses seven boards, the spokesman added.

Effective processor cycle time is said to be 600 nsec.

Two programmer panels are available for the system. The full panel provides switches to monitor and modify the contents of registers and memory; a turnkey panel was designed for applications not requiring the full panel, the firm said.

The heart of the Slash 6 is the system bus that features 48 lines for data and 18 lines for addressing, with all major system elements communicating asynchronously through it to and from memory, the firm said.

The I/O system design allows peripheral controllers and associated devices to be shared between multiple processors, according to Harris. The semiconductor memory uses an 18-pin 4K random-access memory (RAM) which allows packaging of 48K bytes on a single board.

Single-bit error correction using 5-bit code is a standard feature, the firm said, and memory is expandable in 48K-byte increments to 768K bytes. The 24-bit word is used throughout the Slash series.

Floating Point Optional

An optional Scientific Arithmetic Unit (SAU) is offered for high-speed, floating-point arithmetic operations. The SAU instruction set includes double-precision, square-root and inverse arithmetic functions in addition to floating point-to-integer and integer-to-floating point conversion, the firm said.

The Slash 6 can use the complement of peripherals available with other Harris systems, the spokesman said.

Operating software for the system includes the Disk Monitor System, which offers a concurrent foreground/backgound capability, the Disk Operating System, Tape Operating System and Resident Operating System.

The instruction set for the system was described as "comprehensive," with over 120 generic instructions yielding 658 individual operations.

The Slash 6 with 48K bytes of MOS memory costs approximately $14,500; first shipments will be made in August, Harris said from 1200 Gateway Drive, Fort Lauderdale, Fla. 33309.

Canadian Dealer Implementing Mini-Based Net For On-Line Order Processing, Inventory Control

VANCOUVER, B.C. – Finning Tractor and Equipment Co. Ltd., a large dealer of heavy equipment, is implementing a massive order-processing, inventory control and communications message-switching network using minicomputers, the user said.

Finning, which carries a $15 million parts inventory of about 150,000 line items, has 25 parts operations located in British Columbia and the Mackenzie Valley of the Northwest Territories. Each operation maintains its own inventory, and parts stock may vary from one to the other.

Two Data General Corp. (DG) Eclipse C/300 computers will act as the central system for a real-time interactive network of Nova-based systems located in the remote operations. The network will give the firm an up-to-date record of all parts of stock and tell partsmen which locations have a required part on hand.

This information will give partsmen in each location access to parts stocked anywhere in the organization and let them tell the customer when the parts can be delivered, Finning said.

Every location will have an intelligent terminal system made up of a Data General Nova 2 with 32K-byte main memory, two or more CRT displays and one or more 165 char./sec line printers.

Each terminal system will be connected to the central Eclipse system here in Vancouver by dedicated synchronous lines. Each operation will be able to access the Eclipses to determine what parts are available elsewhere.

C.A. Harris, Finning's DP manager, noted that the ability to rapidly process a parts order is important in the heavy equipment industry. "The machinery is a large capital investment and cannot be idle for any length of time," he said.

Number of Uses

"There are a number of things our people can do with the system," Harris said. "A partsman out in Kamloops, for instance, can determine which parts department has a specific part in stock. The system will tell him that it is in, say, the Prince George and Vancouver locations.

"This information lets the partsman compile a complete purchase order line by line, no matter where the parts may actually be located," he continued. "Once the purchase order is completed, the central system will remove the parts from inventory, cut an internal shipping order or order out-of-stock parts from the

(Continued on Page 68)

Pertec Bringing Passel of Peripherals to NCC

NEW YORK – Pertec Corp. will release a passel of OEM minicomputer peripheral products at the National Computer Conference (NCC) here this week.

Among the entries are a series of tape transports that operate with 48 Vdc batteries; 12M- and 24M-byte dual-platter fixed disk drives additions to the Pertec D1000 series; 25M- and 50M-byte disk drives for the D3000 series; and a series of "advanced design" vacuum column magnetic tape transports.

The tape transports, with formatters, were designed for use with uninterruptible systems that use batteries recharged by regular ac current as the primary power source, Pertec said. The units are based on the vendor's T7000 and T8000A digital magnetic tape transports.

A 48 Vdc-to-dc converter can be added to the transport as well as optional formatters and buffers, the firm said, adding the converter costs $300 over the standard price of the T8000A and T7000 units.

The 12M- and 24M-byte dual-platter fixed disk drives were added to the D1000 family, which includes the single-platter D1400 and D1600 drives.

The 24M-byte unit, called the D1660, features two IBM 3336-type nonremovable platters with a 4,400 bit/in. bit density and a 200 track/in. track density. The 12M-byte D1460 has two IBM 2316-type nonremovable platters with bit density of 2,200 bit/in. and track density of 200 track/in.

The D1460 costs $2,085 and the D1660 is priced at $2,710 in OEM quantities, Pertec said.

Extensions to the firm's D3000 series include 25M- and 50M-byte disk drives with four platters (three fixed and one removable cartridge) with each platter individually write-protected, Pertec said.

The D3400E and D3600E permit OEM designers to increase system storage without major redesign, the firm claimed.

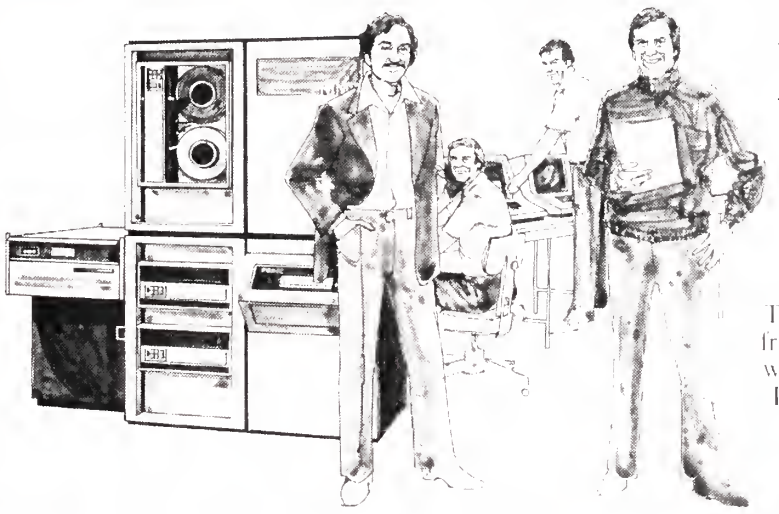
The 50M-byte D3600E features 4,400 bit in bit density and 200 track/in. track density; the 24M-byte D3400E unit has a bit density of 2,200 bit/in. and a track density of 200 track/in.

The D3400E costs $4,260 and the D3600E is priced at $4,420 in OEM quantities.

The T1000 vacuum column magnetic tape transport features speeds of 75- to 125 in./sec, autoload tape threading, modular electronics and built-in self-testing, the firm said.

Standard features include dual-format 800- and 1,600 bit/in., read-after-write hard coated heads. Air bearings were designed in at all turnaround points, Pertec noted.

The T1000 costs $4,955 in OEM quantities, the firm said from 9600 Irondale Ave., Chatsworth, Calif. 91311.



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PRIME

Handles Accounting Functions

Rising Bureau Costs Push Firm to In-House System

By Esther Surden
Of the CW Staff

COMPTON, Calif. Rising costs at a service bureau convinced Strolee of California here to switch its data processing to an in-house system, DevaDas Lon, DP manager, said in an interview here.

However, when trouble developed with the NCR systems they had installed, the firm had them removed and went with Basic/Four Corp.

Service bureau costs had risen from an original quote of $1,600/mo to $7,000/mo. Alvin I. Levine, controller, said. So in late 1974 the firm decided it needed a minicomputer to control its accounting functions, especially its accounts receivables.

Two NCR 399s were rented and "we controlled what we wanted to control," Levine said.

However, when the firm decided it was time to convert to general ledger, the accounts receivable system went down.

Strolee kept trying to get the accounts receivables going and had even ordered an NCR 8200 to upgrade, but when continuing problems were not resolved, Strolee had the systems removed, Levine said.

Examined Alternatives

The firm then examined the alternatives open to it by talking to many mini vendors and telling them it wanted to purchase within 30 days. Only Basic/Four and IBM were responsive, and the IBM 3 was eliminated because of cost, Levine said.

The firm's software was converted at the Basic/Four dealer's office before the system was installed, Levine said. The company has a Model 600 with 20M bytes of disk, 56K of core, four CRTs, one medium-speed and one 300 line/min printer, Lon said. It cost about $100,000.

"The system has increased customer service from a four-week to a 2-1/2- week period without substantially increasing inventory," Levine said.

Strolee manufactures nursery items such as strollers, high chairs and playpens. The firm averages 80 orders per day, 15 line items per order, Lon said.

Two computer operators work with the system, one during the day and one at night. The night operator runs the specialized reports needed for management decision while the other does order entry.

Packages run on the system include accounts payable, receivable, payroll, order entry, a finished goods inventory system, requirements reporting and sales analysis. The on-line inquiry capabilities are considered very important to Strolee.

The system allows Lon to change programs and fix bugs on-line, he said.

The reports available to Levine are very important in running the business and making management decisions, he said. Reports are produced at his direction and can tell him, for example, if shipping to a customer costs more than the profit made by selling, because of the profit margins on certain items, he said.

Sales analysis by salesman, state, company, etc. is also provided by the system.

"I am running more applications on my Basic/Four system than some 360/40 shops," Lon concluded.

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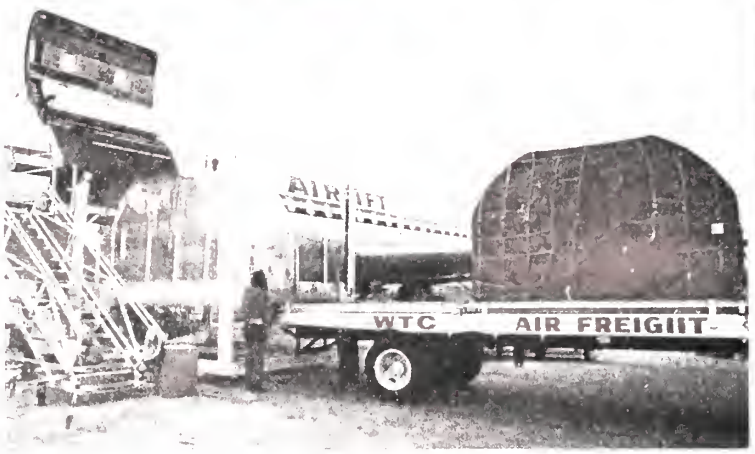

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Canadian On-Line Net Centered on Minis

(Continued from Page 67)

manufacturer."

As the various remote operations tie into the network, the C/300 systems will automatically add and subtract items from any inventory.

"We are making the system as easy as possible for the people in the other locations to use," Harris said. "The CRT terminals there will display a fixed format for inquiry. At the headquarters, each operational department will have a terminal from which it can do a number of operations, provided it has the proper security code."

The system will replace Finning's existing TWX and Telex networks, Harris added. "The synchronous line between locations eliminates the need for these outside services for interoffice communictions," he said.

The firm chose the DG systems after considering Honeywell, Digital Equipment Corp., Hewlett-Packard and IBM because they seemed to have a better "cost performance ratio," Harris said.

When the system is fully implemented, the entire company data base, including items such as customer and personnel files, as well as parts will be stored on the 256K-byte Eclipse C/300 systems' two 100M byte disk storage units.

"One Eclipse system will be running on-line," Harris said, "while the other will be used as a 'hot' backup and for software development."

The network software, designed and implemented by Finning, will provide communications facilities between any user processes regardless of location.

Application programs are written in a version of DG's Fortran 5, modified to support commercial data variables, Harris said.

With all data in central disk storage, authorized personnel will have access to the total pool of company information. The credit manager, for example, will be able to retrieve a customer credit profile which includes customer accounts receivable, payment history, purchase volume and monthly statements.

Similarly, the personnel department will have access to information like wage and salary, employee benefits and employee turnover.

Finning plans to implement the central Eclipse C/300 system in stages. Until that system is fully operational, inventory management and other jobs will continue to be run in a batch mode on Finning's Honeywell 2000 series system. The Honeywell mainframe will be kept for batch processing after the minicomputer network is implemented, Harris said.

The entire network hardware cost about $1 million with about $200,000 in software development costs estimated.

Mini-Based System Helps Put Hospital Back in Black

DAYTON, Ohio – In less than a year, Grady General Hospital here went from a deficit of nearly $23,000 to a profit of nearly $200,000 by applying sound accounting practices and a small business computer to its paperwork load.

But the IBM System 32 and its basic hospital accounting package was not enough, according to Penny Beale, Grady's assistant administrator.

Source documents in use throughout the hospital had to be updated for efficient data collection and input operations.

For this, the hospital called in specialists from The Standard Register Co., she said.

Grady started with 36 beds in 1960 and expanded to 48 in 1968. Until the early 1970s, the hospital and the city's four general practitioners seemed sufficient, Beale explained.

As plans were made to enlarge the hospital to 60 beds, add a new 35-bed unit to replace an old wing and bring in many new ancillary services, it became obvious that procedures used to maintain records and handle paperwork had to be improved.

Recordkeeping was taking trained personnel away from their prime job of patient care, she said.

At that stage, everything was done manually, using standardized forms for charge slips, bills, statements and checks, she said; the only concession to machine assistance was a double-entry posting unit for billing and ledger purposes.

Source Data Problem

Although the hospital decided a small computer would solve many of its problems, it did not solve the problem of preparation of source data, she said.

"We quickly found there were no effective stock forms for the input system," she said.

At this point the hospital called in Standard Register, a firm that specializes in hospital paperwork functions.

The first phase in conversion addressed itself to requisitions, charge slips, admission paperwork, patient billing and specialized third-party billing.

To avoid as much confusion as possible, the hospital wanted new procedures to follow the old as closely as possible, Beale said.

With cooperation from all the departments, the business office, the administrator and a Standard Register health care systems specialist, the company formulated a series of 21 charge slips and related forms used in major activities.

Although the forms presently call for manual entry of charges, the hospital is currently working toward an internal pricing system in which simple codes will trigger the release of correct pricing system in which simple codes will trigger the release of correct pricing from the computer, she said.

Most forms provide copies for lab or ancillary service, the patient's chart, the doctor, the department's file and data processing, she said.

The top copy is an instruction sheet that must be read before the form is completed.

Patient information is imprinted with embossed plastic plates, but information may be handwritten when one is not available, she said.

Two-part charge slips cover functions such as room transfers, discharges, credit memos along with certain services and charges including those for anesthesia, operating and recovery room use, intravenous solutions, labor and delivery room use and respiratory therapy. All these forms, along with the four-part lab test request forms, contain a copy for data processing. The other copy may be for the chart or for department use, she said.

These forms were designed to incorporate as much preprinted information as possible, making it easier, faster and more accurate for nurses or ward secretaries to enter the necessary information by checking boxes.

As the internal pricing system is brought into play, these forms will be changed to reflect the new information needs of a code system, which will provide even more efficiency, she said.

Because of changes in accounting practices, it is impossible to pinpoint the source of our gains, but the fact that gains have been made assures us that the system and the forms that provide the necessary controls are at the heart of the improvement, Beale said.

Because of improved input documents and associated procedures, as well as the equipment efficiency, we are getting reports we didn't know were even possible before, she said.

Nurse completes treatment data for entry into Grady's mini.

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Plus, to support KEP we're offering a new language (REGAL) which helps our 1600 solve a wide variety of business-oriented data manipulation problems. Through REGAL, you can create your own key-entry programs for source data entry, file manipulation and file update — all with surprising ease.

Additionally, executing under ECOS, our local batch processing capability will enable you to perform applications programs at the local 1600 site written in COBOL.

When will all this be available? Harris is already delivering ECOS based systems with local batch processing. Delivery of KEP systems will begin in July.

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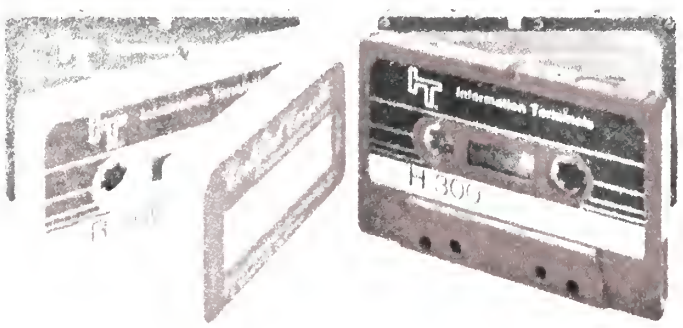

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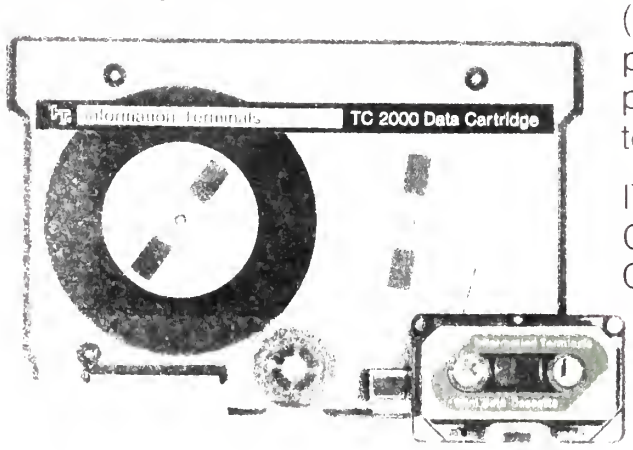

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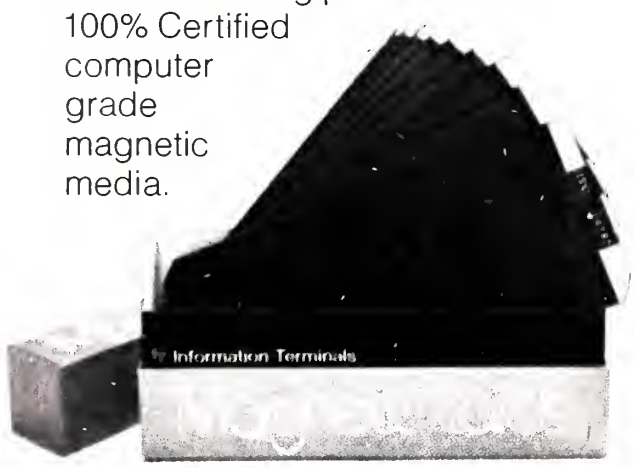

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Moving-Head Disk System Provides 9.9M-Byte Mass Storage For Nova

ANAHEIM, Calif. – An embedded controller and moving-head disk memory system for Data General Corp. Nova minicomputers has a mass storage base expandable from 2.4M bytes to 9.9M bytes, according to its vendor, Datum, Inc.

Called the 4091-N, the system handles one to four disk drives with a single controller, the firm said.

The Datum controller requires one slot position in the mainframe and is designed to be fully transparent to and software-compatible with the Nova computing system, the firm said.

Either 5540-type top-loading units or 2315-type front-loading units can be accommodated, Datum said. Average access time is 35 msec, providing a transfer rate of 312 kbyte/sec.

In single units, the 5091-N controller and cabling costs $2,900, while prices range from $2,900 for the controller with 5M bytes of storage and a fixed disk to $7,800 for the controller with 10M bytes of storage and one fixed and one removable disk, either top-loading or front-loading, a spokesman said from 1363 S. State College Blvd., Anaheim, Calif. 92806.

Microdata Giving Reality 'Face Lift'

IRVINE, Calif. – Microdata's Reality line is in for a "face lift" as well as some software enhancements in the near future, a company spokesman said here recently.

Reality is Microdata Corp.'s turnkey hardware and software system designed for small business applications. The systems are sold through dealers who provide the software support.

The firm has just opened a new group to handle "specials" for users who need nonstandard products or customized systems, he noted.

The "face lift" involves some system repackaging for office aesthetic purposes.

Microdata just recently completed testing on a software package that will allow bisynchronous communications on Reality (the systems would become IBM 2780 emulators.

A 600 line/min printer will be added to the product soon, he said.

Software releases that will increase Reality's throughput are the main thrust of the recent software development. RPG-II will be released for the system this month, the spokesman added.

Enhancements will allow data entry in Microdata's English language, while now the user has to use Basic or Assembly language to enter data, another spokesman added.

Also in the near future, Reality's core capacity will increase from 64K to 128K [illegible] and

Quantex Launches Tape Transport

PLAINFIELD, N.Y. – The Quantex Division of North Atlantic Industries, Inc. has introduced a digital tape transport that operates at 75 in./sec or 120 byte/sec at 1,600 bit/in. featuring the firm's "Floating Shuttle" principle of tape buffering.

The drive uses a lightweight shuttle to buffer the tape during start and stop operations, a spokesman said, "to achieve speeds "formerly the exclusive province of vacuum-column-buffered design."

The transport handles tape reels to 10-1/2-in. diameter, accommodating up to 2,400 feet of computer-grade 1/2-in. magnetic tape. Rewind speed is 300 in./sec.

The capstan accelerates and decelerates the tape in 5 msec.

Standard recording modes are 800 bit/in. NRZI or 1,600 bit/in. phase-encoded, providing either 7-track or 9-track operation. Tape speeds between 25 in. and 75 in./sec can be accommodated, Quantex said.

Interfaces are available for the major minicomputer families, the firm said.

The drive costs $4,400, with quantity discounts available. Delivery is approximately six weeks. The division is located at 200 Terminal Drive, Plainview, N.Y. 11803.

Interdata Systems Get I/O Converter

FORT LAUDERDALE, Fla. – The RTP7410/63 I/O bus converter from Computer Products, contained on a single printed circuit board, plugs into half a controller slot in the Interdata, Inc. models 70, 74, 80, 7/16, 7/32 and 8/32, the firm said.

The bus converter allows the firm's RTP family of analog and digital I/O measurement and control equipment to be operated under the control of the Interdata mini using standard I/O instructions.

Up to eight RTP controllers can be connected to one converter in chain fashion.

The bus converter, including one RTP I/O Bus Cable Termination Card, costs $450, and delivery is 45 days, the firm said from 1400 N.W. 70th St., P.O. Box 23849, Fort Lauderdale, Fla. 33307.

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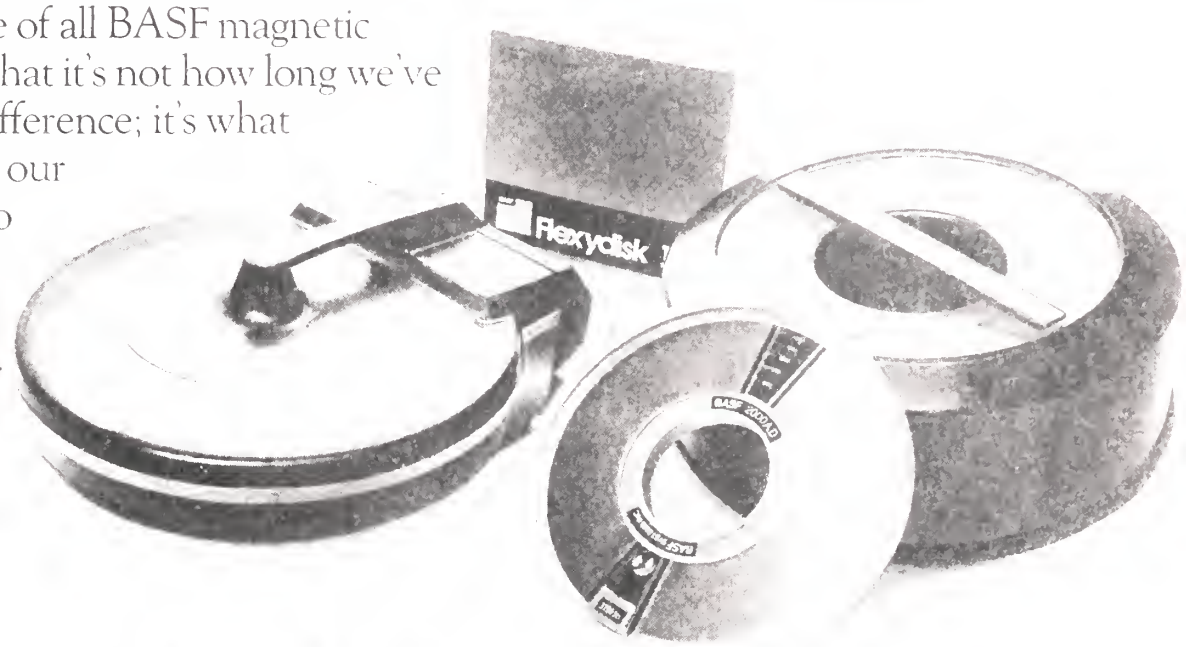

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Machines Used in Range of Applications

Prices, Sizes Seen as Only Things Small About Minis

This is a condensed version from a talk recently presented to the Eastern Iowa Chapter of the Data Processing Management Association (DPMA).

By A. Gordon Holmes
Special to Computerworld

Minicomputers are being used in a variety of applications ranging from stand-alone systems in small- and medium-size businesses to networks of distributed processing in large business environments.

Networks or distributed processing came into use by applying the principle of division of labor to data processing. Now, central or "host" computers concentrate on the big tasks, and other machines handle functions such as data entry, data formatting, message switching, talking to other terminals and performing what other chores they can, but handing off the heavy work to the host.

Such a network may be composed of one big mainframe and a number of minicomputers and can provide more processing power than could possibly be built into a single machine — and at a far lower cost.

Networks like this also have the advantage of locating the processing power where it is needed. The trend toward distributing data processing is furnishing a strong lift to companies that make components for such systems.

This article will be limited mainly to equipment manufactured by companies such as Digital Equipment Corp. (the so-called "IBM" of the minicomputer manufacturers), Hewlett-Packard Co. (HP), Data General Corp. (DG), Microdata Corp., Modular Computer Systems, Inc. (Modcomp) and several others.

There are too many to attempt to enumerate them all here, but basically they all make good sound, solid machines that provide a remarkably good price/performance ratio.

The only things that are small about these minicomputers are their sizes and their prices. They come in memory sizes ranging from 4K to 1M bytes of memory. In most machines, this consists of 2-byte words.

I might point out that 32,767 is the highest addressable location using a 16-bit register. This is overcome with dynamic mapping, which allows programs to reside in memory above 32,767, but to execute only in the first 32K of memory. These programs, though, are swapped in and out of memory at core speeds of 500- to 1,000-nanosecond cycle speed so that a user realizes virtually no degradation.

Standard Peripherals

These machines come with all of the standard peripheral devices such as printers, card readers, paper tape readers and punches, magnetic tapes, plotters, card punches, CRTs, disks, etc.

All of these devices come in a variety of styles and speeds and most are built to be either stand-alone units or desktop units. The disk units are normally provided in 5M-byte or 10M-byte units; however, they can be increased up to 300M- to 400M bytes.

The guts of any computer system, though, comes in its operating system. These minicomputers come with a wide range of operating systems: single-stream DOS, partition DOS, real-time or multiprocessing executives, time-sharing and others.

Single-stream DOS is the traditional batch processing which effectively divides prepares batches of data off-line and submits them to the computer for one big run.

Partition-type DOS is a variation of batch processing which effectively divides the computer up into two, three or four computers and allows multiple program operation, provided a user has sufficient peripherals to perform the job mix.

Real-time or multiprogramming executives are operating systems which respond in real time, meaning now. It is geared to respond to an outside stimulus whether it be from a machine or process it is controlling or from a human in the DP department.

Typically these systems have the ability to schedule programs for execution at a particular time and then to repeat execution at the end of an elapsed time. This provides the ability for the program to execute and then go to sleep every so many seconds, minutes or hours, thus providing a continuum of real-time responses.

Time-sharing is a system somewhat similar to the partition-type operation in that it divides the machine and its resources (typically disk storage) into many pieces and makes each piece available to the user. As long as resources hold out, users are virtually unlimited.

The minicomputer manufacturers typically do not provide much in the way of applications software. However, one area of notable exception is in data base management.

For example, HP provides a data base management system called image, which has a report generator-type language called Query.

Image does a very commendable job of filing and retrieving data and Query will allow the formatting and preparation of simplistic inquiries and reports.

DG provides a system called Infos on its C-300 computer. Infos is not a data base management system per se, but it is a very efficient, high-level file manager which allows for fast, efficient retrieval of information on a record-by-record basis. It does not have any report-generation capability.

Microdata has the Reality system and a language called English. Here again is a true data base management system which very efficiently handles the storing and retrieval of information.

Microdata has also done something else with its Reality system. It has put all its software into firmware with the exception of a 4K monitor. This means no 'sys-gen,' as it is known today, and it means software now operates at true hardware speeds.

Holmes is president of Scoho Enterprises, Inc.

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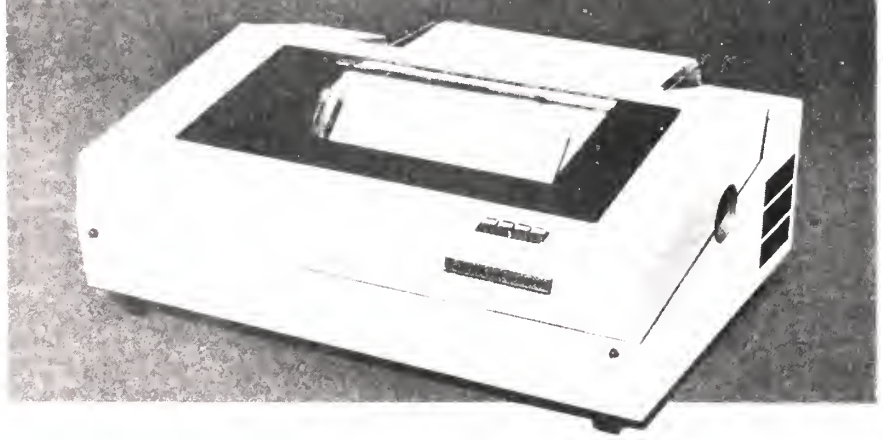

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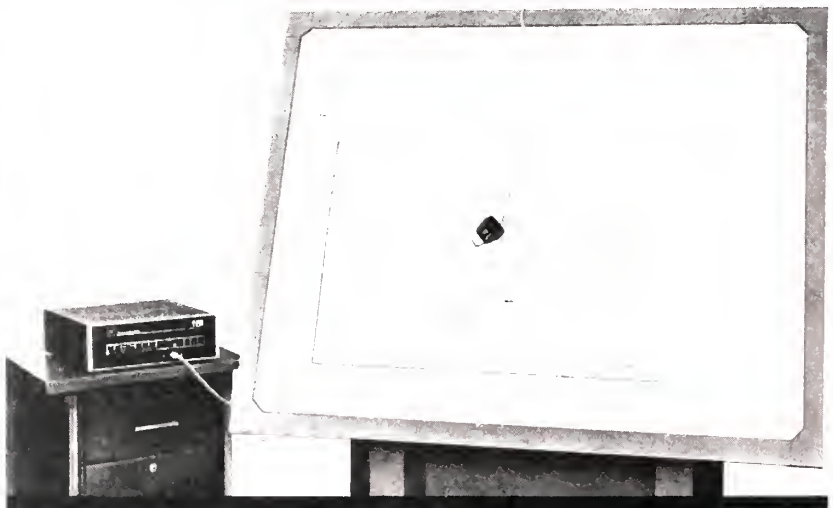

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Dealer Finds 'Canned' Software Satisfies Needs

SOUTH SAN FRANCISCO, Calif. – A photo accessory dealer here found "canned" applications on a small business system to fit his needs at a fraction of the cost to develop them in-house.

"Photo Sales International (PSI) is unique," Allan Gamson, the firm's president said, "and the fact that we turn over 70% to 80% of our photo accessory inventory every week or two provides us with some distinctive and unusual business problems.

"When we decided to computerize our previously manual operations, we explored the possibility of developing applications software unique to our situation. We started that evaluation from a much different base than most companies our size: my wife had programmed large-scale computers; and our consultant has a degree in macrocomputing.

"And yet," Gamson continued, "we settled on Qantel's package for wholesale distributors, 'Solution.' Our reason was relatively simple. It would have cost us $150,000 to $200,000 to duplicate the features already in 'Solution,' which sells for a fraction of that amount.

With the kind of cost differential posed, it was more economical to forego complete individuality and operate within the context of Qantel's package."

PSI settled on Qantel's low-priced System 900 coupled with 'Solution.'

The three-year-old distributor is now considering another video display terminal and upgrading to System 950.

Presently, the firm has the Model 900 with 12M bytes of disk, a CRT and a Centronics Data Computer Corp. printer. The system cost about $33,000 when the firm bought it last October, Gamson said.

At PSI, the operator enters the customer's identification number and 'Solution' fills in the rest of the details: customer name, billing and shipping addresses and any discount categories that apply for photo accessories ordered. Line items are handled in the same way, with 'Solution' providing item descriptions, unit price details and extension values after the product identification number and the unit quantity are entered.

After entry, the operator can obtain high-speed, quality printouts of the orders (including back orders and return orders) or order summaries. The items within each order are printed in sequence of warehouse location to provide a convenient "picking list" when the order is filled. The operator can also change or cancel entire orders or line items within orders or inquire into a customer's file to check on outstanding orders, Gamson said.

Just as with order entry, PSI's operators enter only one number – the order number – to activate the invoicing and accounts receivable features of 'Solution.' One-step invoicing permits the entry of new invoice information and credit or debit memos, directly to the accounts receivable file without going through order entry steps. Cash receipts and adjustments are also applied directly. Once entry is complete, PSI uses 'Solution' to print invoices and summary registers, back-order registers, a cash receipts journal, customer statements, aged accounts receivable reports and trial balances, he noted.

The same common data base that facilitates the order entry and accounts receivable processes also makes possible detailed and definitive inventory control and sales analysis for PSI. All information in the inventory file is accessible for inquiry purposes or four reports and covers not only quantity on hand, but also quantity on order, quantity committed and available, he said.

Sales analysis is by item, salesman and customer and provides cumulative totals, profit percentage figures and commission percentages with a variety of periodic comparisons. Unit entry caused some initial problems with both files, but the problems were addressed and resolved.

The payables and general ledger features of 'Solution' were the last to be installed.

Information Gathering Important in Judging Turnkey Vendors

By Leonard Farano
Special to Computerworld

How does the end user go about selecting a turnkey vendor? A first-time user will probably be introduced to a turnkey systems vendor by the minicomputer manufacturer he has called for information.

In addition, some of the larger, more successful application software firms are beginning to advertise turnkey services in data processing magazines and newspapers.

Let us assume the equipment being offered is manufactured by a viable, reputable mini manufacturer who can and will provide a separate service maintenance agreement. Let us further assume the equipment proposed appears sufficient to satisfy the end user's capacity needs.

The following additional information must be gathered to properly evaluate the turnkey systems vendor:

- Has he responded professionally to the user's specification bid?
- Does he have both the technical expertise and the application experience to deliver a quality product?
- Is he financially stable?
- Can he demonstrate successful installations of similar applications on similar equipment?
- Does he have a good track record for delivering systems on time for the original price quoted?
- Does he have specific industry knowledge?
- Will he take delivery of the equipment for testing and only redeliver to the end user when he has deomonstrated that the system works to the user's satisfaction?
- What is his software maintenance policy?
- Is he capable of installing systems at remote locations, i.e., in a distributed network?
- Does he use standard operating systems and languages?
- Will he assist in the conversion and training effort?
- Can the user interview and approve the specific individuals who will be assigned to develop his system?
- Does he have sufficient personnel available to handle the user's requirements?

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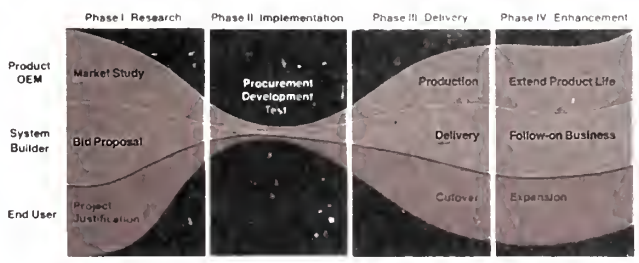

Interdata's computer products and services exist for one reason to satisfy our customers. The Product OEM, the System Builder and the End User. Each of these computer buyers has a Computer Life Cycle with four specific Phases: Research, Implementation, Delivery and Enhancement. Interdata responds to customer needs during each Phase with Computer Life Support.

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SOFTWARE PROFESSIONALS NCC INTERVIEWS

Today, more than ever before, software professionals are influencing the direction Digital takes. We're looking for the very best professionals who can help us make the computer an even more effective tool within our present markets and who are far-sighted enough to see beyond the present capabilities of the computer to new markets and applications.

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Software Engineering

Communications and Networks

The Communications and Networks Group has the charter for the design, development, and enhancement of all DECNET and related communications software and microprogramming.

In these positions you will be responsible for the design and implementation of front-end and test of communication software relating to operating systems, remote work entry stations, terminal concentrators, foreign machine interfaces, network protocols, and block mode terminal software.

We require 2-7 years experience in software design with an emphasis on communications protocols, front-ends, networks, and communication emulators. Experience with PDP-11 assembly language and a degree or its equivalent in Computer Science or Electronics Engineering is desirable.

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In this highly visible and dynamic organization you will be a member of a research team whose function is to investigate future technologies, design and implement prototype systems, and to provide consulting services to engineering development groups.

We require exceptional qualifications in terms of both theoretical and practical aspects of systems development.

Ideal candidates would have a PhD or equivalent in Computer Science and have demonstrated significant research activity in any of the following areas: Operating Systems, Software Reliability, Networks, Microcomputer Multi-Processing, Software Advanced Development, or Automated Applications Programming.

Systems Implementation Language Development

If you are tired of bit pushing in assembly code; and languages like ALGOL, BCPL, PL/1 or BLISS are part of your vocabulary, then you are the kind of person we are seeking to join a growing development team producing new and expanded BLISS implementation language processors and support tools.

We are looking for people at all levels of experience who will contribute at all phases from language design through integrated testing. A BS or MS or equivalent in Computer Science with special interest in language design and compiler development is desirable.

Software Engineering

Digital is seeking highly motivated software developers who have 3-10 years of systems oriented software experience. Applicants must possess a high level perspective on the state-of-the-art of software methodology and must demonstrate the ability to work creatively with both top level management and technical engineers. Successful candidates must be able to personally design and implement software for PDP-11 systems.

Openings now exist in the Software Quality Management organization for developers who will implement software tools and technology that will aid us in producing the best software products in the industry.

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Software Development

Industrial Automation

This is a unique opportunity for software professionals with experience or an interest in industrial automation to assume highly challenging and rewarding positions with our Industrial Products Group. Ideally, you will have minicomputer operating systems or applications experience in the field of industrial automation or you will have a strong software development background and an interest in applying your expertise to industrial automation.

This is a growth opportunity offering involvement with both minicomputers and microprocessors, and an excellent opportunity to learn and develop programs in higher level languages as well as microprocessors. Contribute within an environment where the problems associated with developing software are appreciated and every attempt is made to establish a planned and organized approach. If you are ready for this challenge, we would like to talk to you.

Project Management

You should have a BS degree and at least 7 years experience in Real-Time application systems development.

Previous management or supervisory experience in developing customer software/hardware minicomputer systems as well as good customer interface and interpersonal communication skills required.

You must be familiar with Real-Time Operating System concepts including related applications experience in areas such as factory data collection, materials handling, process monitoring and control, communications, inventory control, and data base management.

This position is available in CSS (Computer Special Systems) and will be temporarily located in Maynard until Nashua is open in late summer or early fall.

Applications Programming

We have openings for programmers with a BS degree and 3-5 years experience in assembly language and FORTRAN applications in a Real-Time environment.

You'll need PDP-11 assembly language, familiarity with Real-Time Operating Systems concepts, as well as familiarity with RSX-11M, RSC-11D operating systems.

You should also have experience working on a programming team, developing applications systems in areas such as manufacturing, power systems, materials handling, machine control, data acquisition, process monitoring and control.

This position is available in CSS (Computer Special Systems) and will be temporarily located in Maynard until Nashua is open in late summer or early fall.

NCC Interviews

Please phone Justin Kelleher at (212) 758-2600 to arrange an appointment to discuss the following positions: Software Engineering Communications and Networks, Research and Advanced Development, Systems Implementation Language Development and Software Engineering.

Please phone Art McMahon at (212) 758-2600 to arrange an appointment to discuss the following positions: Software Development Industrial Automation, Application Programming and Project Management.

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Firm Goes to Mini to Handle 25% Increase in Volume

NEW YORK – Installing a turnkey minicomputer allowed a property management agent here to increase its volume 25% without hiring additional personnel.

Adding the two new large accounts might have been impossible without a computer, regardless of the personnel factor, according to Howard M. Sonn, president of Sonn-Saalberg Co., Inc.

"Quick information is a prime factor in giving a client proper service," Sonn said.

Owners of residential properties are hard-pressed to withstand rises in taxes, fuel, equipment, wages and other costs, he said. Securing optimum results via the prompt processing of bills, follow-up of arrears, preventive maintenance, etc. is essential, he said.

The firm has more than 6,000 apartment units under management in 152 properties owned by 86 clients in the metropolitan New York City area. A typical building is a six-story elevator apartment house with 60 families, with a range that extends from three families over a store to a 600-unit development of five 15-story buildings on seven acres.

Such a client roster generates a vast amount of paperwork that is expensive to process and highly resistant to analysis. Just getting out the rent bills and monitoring collections are major operations in themselves. So Sonn-Saalberg decided it had to upgrade its essentially manual data processing mechanism.

The major options considered were time-sharing, service bureau or an in-house system. The firm opted for the last, on the premise that it would be the most cost-effective way to keep abreast of its requirements.

Turnkey System

The company selected a VMAC/II system from Columbus Computing Corp. of New York. Employing a Micos operating system and hardware by Mini-Computer Systems in Elmsford, N.Y., Columbus supplied a turnkey system for realty property management.

The most significant result since the system went into full operation in January has been "achievement of a highly cost-effective means of servicing our accounts," Sonn said. Data processing costs are less than 35 cents per month per tenant unit, he added.

The basic configuration is a Data General Corp. Nova 2/10 CPU, Diablo 44 disk drive, Centronics Data Computer Corp. printer and two Hazeltine Corp. video display terminals. The Sonn-Saalberg system has five terminals on-line.

Current personnel were trained as operators and no technicians were hired for daily operating purposes, he added.

Six basic modules make up the system: tenant billing, accounts receivable, accounts payable, payroll (both Sonn-Saalberg and landlord personnel), management reporting and video inquiry and owner-reporting subsystems. The basic package provides about 20 reports regularly, with 20 more generated on demand, he said.

Among the reports are: statement of collections, statement of disbursements, arrears report, rent roll listing, collection performance and commission reporting.

The maximum base rent report controls rent increases in New York City rent-controlled buildings and is also on-line. Before computerizing, Sonn-Saalberg could review just one building a day. Now it handles all properties under its management in one hour, greatly facilitating owners' ability to ask for more rent, Sonn said.

With all files updated upon receipt, the video inquiry feature has been very productive, Sonn said. "Since data is put in and taken out simply and rapidly, with our operators able to read it from the screen, we are secure that the landlord or the tenant, for that matter, can ask any reasonable question about his account and get the right answer right away. In this business, that is a substantial achievement."

Single-Board Memory Contains 256K Bytes

CRANBURY, N.J. – Dataram Corp. has introduced its DR-128 single-board 256K-byte core memory system. Containing 2.4M bits, the DR-128 is the "industry's largest capacity single-board core memory system," the firm claimed.

While providing speeds in the main memory range, its capacity makes it suitable for high-performance peripheral applications, the firm said.

The DR-128 can be addressed as either 256K by 9 bits or 118K by 18 bits. Up to eight DR-128 systems or 2M bytes of storage can be contained in one chassis, Dataram noted. Cycle time is 1.3 μsec and access time is 650 nsec, the firm said.

The DR-128 costs $6,500 in single quantity and $4,750 in 100-unit lots. Dataram is located at Princeton-Heightstown Road, Cranbury, N.J. 08512.

Automatic Loader Released For Floppy Disk Testers

PHOENIX – Three Phoenix Co. has introduced an automatic loader for floppy disk testers, the firm said.

The Floppy Disc Auto Loader was designed for a Memorex 652 disk drive, but can be adapted to most floppy disk drives, a spokesman said.

The loader can handle up to 20 disks at a time, eliminating the insertion and removing by hand for each disk tested. When used on the Three Phoenix tester Model FD-33, 50 disks can be tested in about an hour, including six seconds required for loading and unloading, he said.

A dual stacking mechanism offsets rejected disks 1/2 in. from good disks, allowing easy separation after testing is completed, he added.

A two-pocket stacker that physically separates good and bad disks is also available, he said.

The Floppy Disc Auto Loader costs $3,250. Three Phoenix is at 10632 N. 21st Ave., Phoenix, ARiz. 85029.

Model 204
Database Management Software System

"Overall, we found Model 204 to be one of the most capable data base management systems we've ever analyzed, and certainly one worthy of the consideration of anyone shopping for a DBMS for his OS or OS/VS IBM System/360 or 370 installation."
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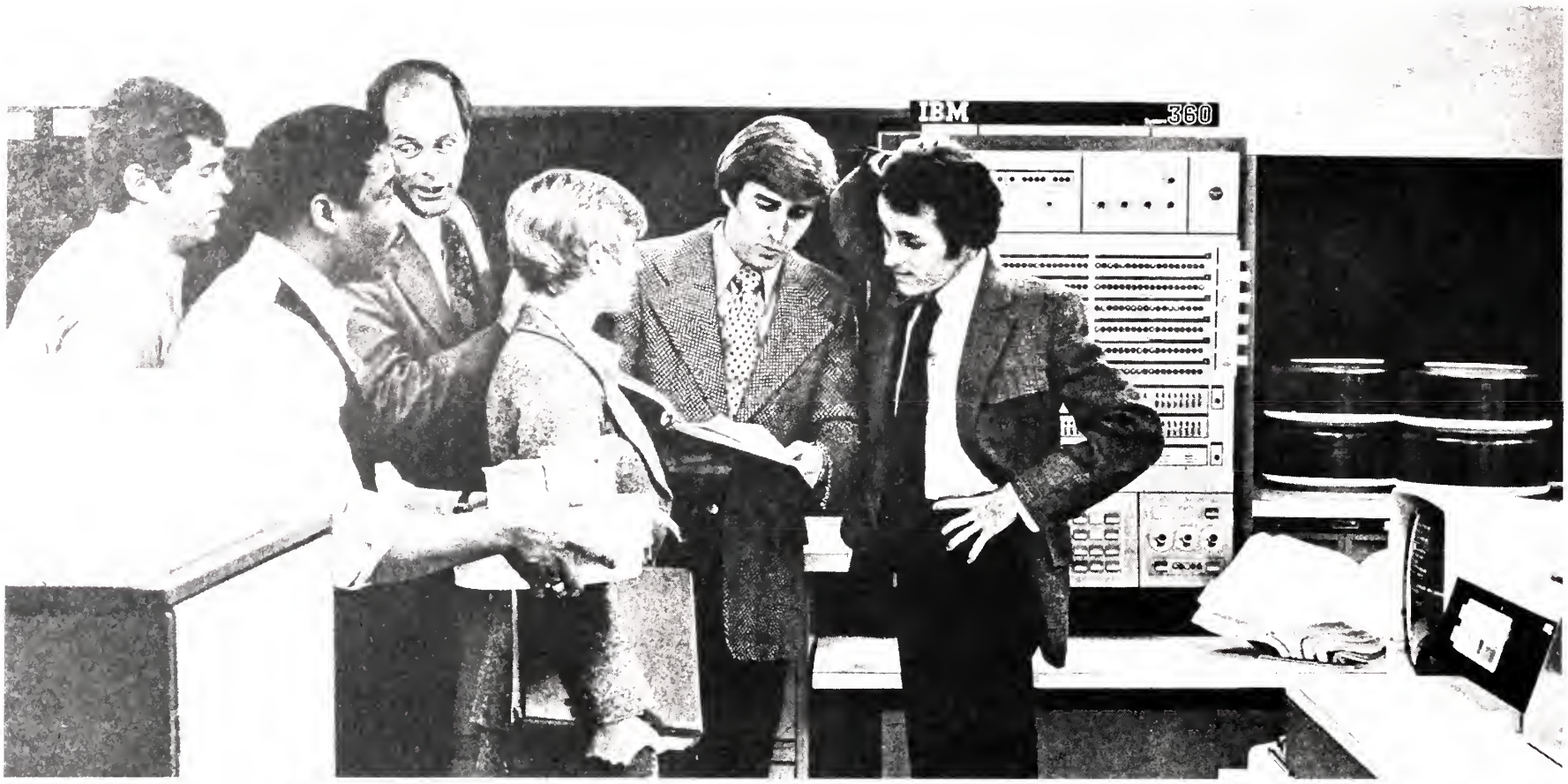

Your mother needs help.

At one time, people were willing to wait around for your big computer to get around to them.

No more.

Now they're demanding more work, faster than your mother can possibly do it.

Which has put you in a rather difficult position. You've either had to put them off, or put your mother through an upgrade so expensive it's unreal.

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The C/300 is smaller than the big computers you may be used to using. But it has the things big computers have. A comprehensive commercial instruction set that even has an EDIT function, for example. And large memory configurations.

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And the C/300 has intercomputer communications ability that lets you interface to your mother. Directly via channel connect, or via communication lines so it can emulate 2780's or HASP. Or be itself. And, wherever you put an ECLIPSE C/300 you can hang terminals off it with synchronous or asynchronous lines.

The COBOL that comes with the C/300 is the highest level implementation of ANSI 74 COBOL standards. It's a complete language system that comes with features like an interactive debugger. And an integrated SORT/MERGE.

And you can get all your peripherals at Data General. Because Data General has all kinds of discs, tape drives and printers. In all sizes. Discs for example, come in anything from a floppy to 3330-type 90 megabyte drives.

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Real-Time Machine Gives Weathermen Clearer View

VANCOUVER, B.C. – A real-time minicomputer has helped meteorolgists at the Pacific Weather Center (PWC) here improve the accuracy of their forecasts, the user said.

PWC provides public, marine and aviation forecasts in this Canadian province, where climactic zones range from almost desert-like interiors to coastal areas with more than 300 inches of precipitation a year.

The user installed a 32K Hewlett-Packard 2100S mini with Real Time Executive I (RTE/I) software in October 1973. Last year PWC decided to accelerate forecasting procedures by replacing its Teletype 33ASR terminals with interactive display terminals to handle the fast changes in weather conditions.

Previously the forecaster would gather the line-printed data, make an analysis and then type up the forecast. It was then sent to an operator who retyped it on a Teletype with the appropriate codes.

It was retyped a second time on paper tape to prepare it for transmission.

Now the meteorologist edits the forecast on the CRT screen and the result is punched out on paper tape. The tape is then fed into the mini, a spokesman said.

"Eventually, we will be able to eliminate the paper tape and block transfer the completed, edited forecast to the CPU for transmission," he continued.

Forecasters can also summon observations by station area, trend and circuit sequence and, if desired, can highlight specific meteorological conditions. A display enhancement function points up adverse weather conditions such as rain, snow or fog.

Memory Most Important

But the most important feature in terms of expanding the capacity of the system, PWC engineers said, is the CRT's memory.

With an internal memory capacity of up to 8K, the user can gather and store all the data needed in the terminal.

The system designers also replaced RTE I software with the RTE II, which allows the CPU to accommodate several terminals simultaneously, the spokesman said.

The plotting of surface maps is a regular PWC routine done four times each day. Synoptic reports are plotted on a chart every six hours, a job that previously required two man-hours to complete.

Using the mini-driven printer/plotter, the task can now be accomplished in 9- to 10 min, according to the spokesman.

PWC meteorologists first recognized the need for computerization in 1969 and subscribed to a time-sharing service. But with only two to three hours of terminal time, use of the computer focused primarily on research development, forecasting remained a time-consuming manual procedure.

Eventually the need for high-speed data collection, data manipulation and computed forecast parameters led PWC to investigate the use of a real-time minicomputer.

"The time-sharing budget was going up rapidly – topping $40,000 a year," the spokesman said. "One of our ongoing routines, like the probability of precipitation, might have cost $4, but at four times a day, 365 days a year, that's pretty expensive.

"Now multiply that by 25 to 30 routines and you can understand the problem," he added.

In addition to the mounting costs, the time-sharing service [illegible] improvement, [illegible] PWC's paper problems [illegible] and a Telex [illegible] flow of [illegible] network [illegible] stored, filed and analyzed before reaching the computer.

"Now we use [illegible] others use a medium to large [illegible]," the spokesman said.

Xebec Has Formatter Storing 1.2G Bytes

SANTA CLARA, Calif. – The Model XDF-76 disk formatter from Xebec Systems, Inc. operates with IBM 3340-type disk storage modules and provides 40M- to 1.2G bytes of storage capacity, the firm said.

The formatter features error-correction codes, rotational position sensing and interleaving for consecutive sector transfers, a spokesman added.

Additional features include 128K-byte transfer in one operation, overlapped seek of up to four drives simultaneously, 512-byte buffer for computer/drive synchronization and multiport capability, Xebec said.

A typical storage module system with a 100M-byte capacity costs $13,200 while a 300M-byte system costs $24,000, the firm said from 2985 Kifer Road, Santa Clara, Calif. 95051.

VMF Uses Micro to Control Tape I/O Storage System

BAYSHORE, N.Y. – VMF Industries, Inc. has introduced what it said is a "totally flexible" microprocessor-controlled RS-232 tape I/O storage system.

The VMF system utilizes a 3M Co. data cartridge, variable size random-access memory buffers and a single or dual cartridge control system with an Intellec 4040 microprocessor.

Teletypewriter, RS-232 and other communications formats are available, with switch-selectable speeds from 110- to 9,600 bit/sec, the company said.

The system is priced at about $5,000 and includes a 4-track, read-after-write system with 48K-byte transfer rate and over 5M bits of unformatted storage, VMF said from 216 N. Fehr Way, Bayshore, N.Y. 11706.

WE Has PDP-8 Memory Semi

HOUSTON – WE Computer Extension Systems has a semiconductor memory system that plugs up to 8K of memory directly into one slot of the Digital Equipment Corp. PDP-8 Omnibus chassis, the firm said.

The system is available in two models, 8K 12-bit words and 4K 12-bit words.

A field select jumper matrix allows memory field assignment in 4K increments, a spokesman said.

The 4K version costs $400 and the 8K version costs $650 from the company at Suite 176, 17311 El Camino Real, Houston, Texas 77058.

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1200 LPM LINE PRINTER

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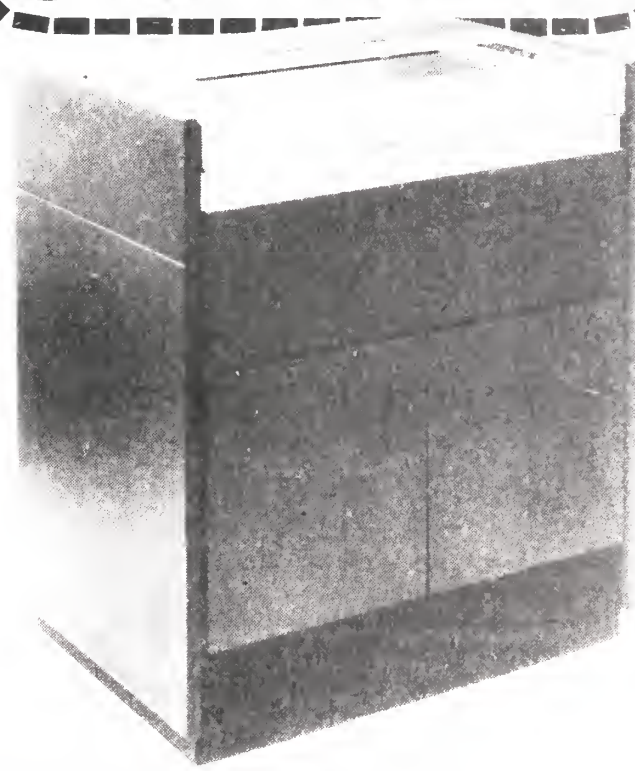

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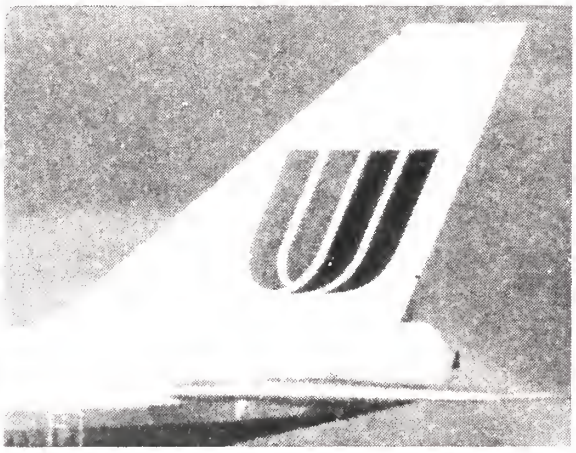

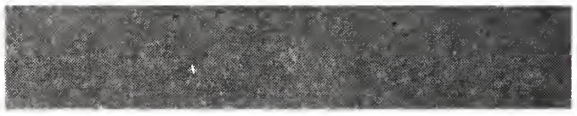

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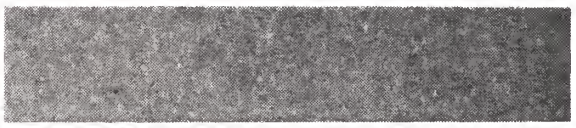

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As computer technology has traveled across the world, so has MDS. Our products are marketed and serviced through approximately 300 of our own offices in the United States, Canada, Western Europe, South Africa, and through independent distributors in more than 50 other countries. This far-reaching network permits us to serve multi-national companies with the international expertise that's absolutely essential. That's why we're the intelligent choice of the Fortune 500!

We'd like to tell you why all the companies pictured here -- and many more too numerous to name -- prefer MDS. We think their reasons will prove right for you, too. Contact your local MDS representative, or call or write us directly -- so you can make your own intelligent choice.

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Used for Accounting

Service Finds Portable Unit 'Best Deal'

STERLING HEIGHTS, Mich. – A travel service here is using a portable desk-top system for its general accounting functions.

Travelcraft, Inc. considered Nixdorf and Burroughs systems before settling on an IBM 5100. "It was the best deal for the money," according to Gerald Choma, owner of the firm.

"In just a few months, our savings in cash flow alone have more than justified the addition of the computer in our business," he added.

Travelcraft bought a 32K machine with a printer and auxiliary tape unit for about $18,000, he said.

"With the increase in leisure time and more affordable tours, we're seeing a significant increase in travel.

"That's the good news.

"The bad news is that the resulting accounting involved – particularly for commercial accounts – virtually dictates the automation of accounting and billing activity," he said.

"The tickets we draw from air carriers must be paid for every seven days. From a business cycle standpoint, that makes cash flow critical," Choma said.

Travelcraft switched from an accounting service to its own system because "the software was on a 30-day cycle and was too much outside of my control," he said.

"Even though I had absolutely no experience with computers previously, I now have 26 different computer programs running that I wrote for my business," he noted.

Choma currently does all of his own accounting for all sales, which include cash, credit card and commercial accounts. He now also has complete asset controls, bank balance records and check journal accounting operational.

In addition, the employee payroll and required supporting records are now on the system.

"To illustrate the kind of speed we now have possible," he said, "we recently had a commercial billing paid for in just two days. There was absolutely no way we could do that before.

"What I've accomplished can easily be justified in a $1 million travel agency.

"We're in a business where we're responsible for a lot of money that isn't ours," he said. "With the portable computer we've been able to better manage our business and our all-important cash flow."

Travelcraft acts basically as an escrow agent for a multitude of carriers and travel-related businesses. But he added, it's important to have the employees selling and the computer doing the required accounting work.

In the future, Choma anticipates using the system for inventory control of reserved hotel rooms and airline seats.

Infotek Memory Ups HP 9830A to 32K

COVINA, Calif. – The EM-30 extended memory system from Infotek Systems extends the total read/write memory capacity of the Hewlett-Packard Co. (HP) 9830A Basic programmable calculator to 32K bytes, the firm said.

The EM-30 is compatible with all Basic software and HP read-only memory options and uses 4K random-access memory chips, the firm said.

The memory is said to be a direct plug-in replacement for the standard HP memory and costs $5,320 from the firm at 733 E. Edna Place, Covina, Calif. 91723.

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Unit Requires +5V, +12V Power Supply

ENGLEWOOD, Colo. – The 8080+ Development Station from Monolithic Systems Corp. is a fully assembled microcomputer that requires only a +5V and +12V power supply to be fully operational, the firm said.

It includes Monolithic's 8080+ microcomputer with control panel and wire-wrap section, 16K dynamic random access memory (RAM), 512 words of erasable programmable read only memory (Eprom) and an operating system loaded in 4K of writable read-only memory (ROM), the firm said. The operating system includes resident assembler, editor, and teletype software/hardware interface, it noted.

A basic development station costs $1,976. Monolithic is located at 14 Inverness Drive East, Englewood, Colo. 80110.

SMS Enhances Device

CORNING, N.Y. – Scientific Micro Systems (SMS) has improved the processing speed of its bipolar microprocessor and has introduced two new I/O interface components.

The SMS 300 CPU now provides minimum system cycle time of 250 nsec compared with a 300-nsec cycle time previously.

The faster cycle time permits direct control of double-density floppy disks, SMS said.

The two I/O units are the SMS 362 and SMS 363 interface vector (IV) bytes. Both feature external clocking and input latches which operate asynchronously with CPU timing.

In quantities of 100, the components cost $90 and $8 each for the CPU and the IV bytes, respectively.

Scientific Micro Systems, Inc. is at 520 Clyde Ave., Mountain View, Calif. 94043.

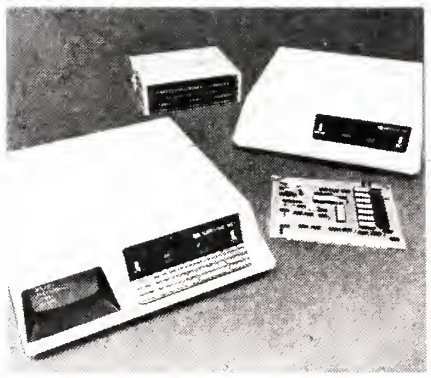
PCS Announces 180 Family Built For Industrial Environments

FLINT, Mich. – The PCS 180 family from Process Computer Systems (PCS) are industrial microcomputers that work in dirty, corrosive environments, the firm said.

The 180 systems "use tristate bus logic to ensure that both high- and low-speed peripherals can be interfaced with a high degree of bus efficiency," the firm said.

The 180 series is expandable: if a process is changed, building blocks can be changed or added without rewiring or prolonged shutdown of equipment, it noted.

The top of the PCS line is the Superpac 180 which provides both full Ascii keyboard and CRT display capability in a single package. The system includes the PCS 1806 microcomputer, the firm said, and costs under $1,000 in 50-unit quantities.



PCS 180 Microcomputer Family

The Micropac 180 is a rack-mountable industrial microcomputer system priced at $695 in quantities of 50. The system includes the PCS 1806 as well as a four-slot chassis, power supply and industrial front panel with on/off switch and status indicators, the firm said.

The single-board PCS 1810 includes power fail/auto restart and battery backup to support its 256 bytes of memory for up to 10 days, the firm noted.

Users can build onto this basic system by adding memory, I/O and peripheral and communications options, PCS said. The 1810 costs $300 in quantities of 50.

For applications where battery backup is not important and where more memory is required on a single board, PCS offers the 1806. The 1806 comes with1K byte of Random Access Memory and provisions for 7K of erasable read-only memory or read-only memory. The unit costs $256 in quantities of 50, it said from 5467 Hill 23 Drive, Flint, Mich. 48507.

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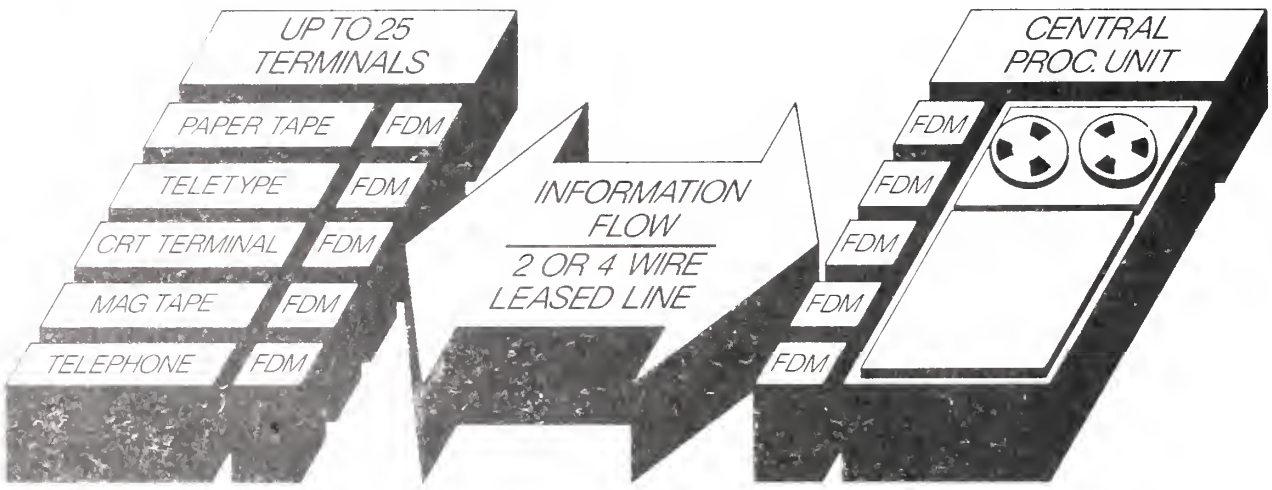

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Micro Products

MC80 Controller Available From GNAT

SAN DIEGO, Calif. – The MC80 micro controller from GNAT Computers is a mini system CPU for dedicated applications use such as process control, instrumentation and communications systems, the vendor said.

Using an Intel 8080-type microprocessor, the system is contained on a single card and features 256 words of read/write static random-access memory, expandable to 512 words, and up to 2K of custom application programmable read-only memory storage.

The structure and compatibility of the MC80 is such that is allows full usage of I/O peripherals, the firm said.

The MC80 costs $189 from the firm at 8869-C Balboa Ave., San Diego, Calif. 92123.

Dynage Introduces Power For Micro-Based Systems

BLOOMFIELD, Conn. – A power supply designed for microprocessor-based systems is available from Dynage, Inc.

The Model 3MA-MP provides power for the CPU module plus peripheral modules, including memories in systems applications, Dynage said.

Three outputs are furnished. All are provided with independent overvoltage protection and are temperature compensated and adjustable, the firm said.

The Model 3MA-MP costs $175 from the vendor at 1331 Blue Hills Ave., Bloomfield, Conn. 06002.

Improvements in Minis' Magnetic Media Seen Coming Through Error Correction

NEWPORT BEACH, Calif. — Magnetic media and devices for data storage have reached an engineering plateau, and improvements for the near future will result from more effective testing and built-in error-correction techniques, an audience of computer professionals was told here recently.

Speaking specifically of demand for greater density of stored data and higher read/write speeds, Michael S. Shebanow, vice-president of engineering for Pertec Corp.'s Peripheral Equipment Division, said he foresees no major technological advances making a significant impact in the near future.

"The more stringent demands of new minicomputer systems will be met by more reliable production testing on the part of manufacturers and through the implementation of error-detection and correction methods that are now chiefly limited to big data system files," Shebanow said.

An example of the error correction technique is a read head offsetting feature on some systems, he said. The read head searches from edge to edge of a track location if no signal is found where one is expected.

Other error-correction techniques Shebanow expects to be available for low-cost minicomputer systems are variations of techniques now limited to large systems, such as track or sector reassignment.

Large system controllers using hardware and software methods can automatically define the locations of defects on a disk and then format information for storage so these areas are not used, he said.

Still another approach is to employ special algorithms based on, for example, the "fire codes" which were used in the IBM 3330 drive. In this system the data can be reconstructed even if a number of bits are missing in a record, Shebanow noted.

These improvements are coming into demand because minicomputer system manufacturers want to store more and more data without increasing storage cost per bit, Shebanow said.

As density increases and pulse transition for reading and writing is done faster, defects in the media become more critical.

Production testing of some manufacturers is providng inadequate for disks that are used to the limit in minicomputer systems, he said.

"It has long been considered adequate to test an unmounted 200 step/disk at 400 step/in. The overlap provided by this method was considered sufficient to surmise whether a bit could be lost," Shebanow siad.

"Recent studies, however, have shown that the single-disk, double-track test does not ensure a very high level of reliability for worst-case applications of advanced minicomputer systems.

"We have reached the point where thoroughly reliable testing must be done under actual conditions," Shebanow concluded.

Compunetics Has Mini With Micro

CHICAGO — A turnkey microprocessor-based minicomputer from Compunetics, Inc. was designed for small- and medium-scale organizations, the vendor said.

The system can accommodate multiple controllers with up to eight CRTs, four floppy disks and four hard disks per controller, a spokesman said.

A typical system selling for $12,000 includes the firm's CPU, one 1,920-character CRT, two 315K-character floppy disks, a 65 line/min printer and software, Compunetics said from 327 South La Salle St., Chicago, Ill. 60604.

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CI Notes

Bills in House, Senate Reduce 'Disc' Incentives

WASHINGTON, D.C. – Tax bills approved by both the House Appropriations Committee and the Senate Finance Committee will reduce but not end tax incentives offered firms that export U.S.-manufactured goods through domestic international sales corporations (Disc).

Under the current Disc program, American firms are permitted to set up separate subsidiaries to handle U.S.-manufactured exports; one-half of the income earned from these overseas sales can be deferred indefinitely.

The House bill would permit companies to defer taxes only on about 25% of such earnings, using a formula that involves averaging earnings over a moving base period.

Thus the first 75% of Disc income would be taxable and payable at once at the same rate as a firm's domestic earnings.

The Senate bill sets a floor of 60% and a somewhat different base period.

The House bill eliminates Disc benefits for military goods. The Senate bill retains Disc eligibility for military goods that compete with foreign-made products.

The House bill would cut the tax break received through Discs by $550 million annually; the Senate bill would reduce that tax break by about $460 milion.

X3A1 Seeks Data on Matrix Printers

KEENE, N.H. – The American National Standards Institute (Ansi) X3A1 ad hoc committee on dot matrix printing is studying OCR-A and OCR-B characters as currently being printed using dot matrix techniques.

Manufacturers who believe they are capable of printing these characters using a dot matrix technique are asked to contact chairman Bruce Norlund at 150 Congress St., Keene, N.H. 03431.

Supershorts

General Computer/Systems, Inc.'s new Australian distributor is Datronics C.M.A., which replaced Datanamics in that capacity.

– – –

Centronics Data Computer Corp. has named UTE Engineering and Trade Co. as a nonexclusive distributor in Turkey.

– – –

Data Dimensions, Inc. has agreed to market Diablo Systems, Inc.'s Hyterm terminal.

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Ontel Corp. has selected Interscan Data Systems, (U.K.) Ltd. to market, service and develop European applications for Ontel terminals.

Welke on Software Bundling:

Support, Not Price, Paramount Criterion

By Edith Holmes
Of the CW Staff

NEW YORK – Price is not the important factor when computer users decide to buy software, according to Larry Welke, presdient of International Computer Programs, Inc. (ICP).

Both the price of a software product and the decision to buy it hinge, instead, on users' willingness to pay for services, he said here recently.

Appearing as a witness on behalf of the U.S. government in its antitrust suit against IBM, Welke told the court users will continue to pay higher prices willingly, – as they did in the 1960s when systems prices were bundled – whenever the additional money assures them of support, maintenance and education from the vendor.

The advantages mainframe makers found in bundling their hardware and services into one price prior to IBM's unbundling in 1969 are the same advantages independent software suppliers find by including support with their software products today, he suggested.

Welke said he once believed unbundling would benefit users by giving them a wider range of alternative products and vendors.

After hearing users complain about separate prices for equipment and services in the wake of IBM's move to unbundle and watching only the more cost-conscious among them take advantage of the freedom to pick and choose in the marketplace, however, he said he now maintains unbundling only benefits "commercially mature" marketplaces.

Bundling "is advantageous in a young industry," he said. It was important to the development of the computer industry from the 1950s through the 1960s and it's important to the development of the software industry now, he added.

In the commercially immature industry, bundled prices give users two different advantages, Welke said.

First, with one price to contend with, users have a predictable cost against which they can budget. The more sophisticated users will find a way of breaking out costs and controlling them; for many others, however, computing has sufficient elements to make this task appear too difficult, he said.

In addition to finding one dollar amount easier to deal with, Welke said users gain an insurance policy against unknown problems by relying on the vendor.

A single price provides a single source to go to with the assurance that whatever problems have been encountered will be solved, he said.

Before IBM and other computer system manufacturers unbundled software and services, users felt "education, mainte-

(Continued on Page 86)

IBM No. 7 Among Fortune 500; List Includes 22 Industry Firms

By a CW Staff Writer

NEW YORK – In 1975, a year in which a bearish market of two years' standing gave way to a bullish one, 22 computer manufacturers were represented in *Fortune* magazine's listing of the 500 largest U.S. industrial corporations.

While Exxon and General Motors retained their number 1 and 2 positions respectively in the 500 listing, IBM increased its sales by nearly 14%, moving that corporation up two places into seventh, ahead of General Electric and Gulf Oil.

But in terms of assets and net income, IBM ranked fourth and second respectively.

In other impressive gains in the listing, three newcomers to the 500 made a showing. Ball Corp. rose 93 points to rank 429 in sales, Foxboro Co. rose 73 to 490 and Tektronix rose 62 to 457 while Perkin-Elmer Corp. returned to the 500 with a gain of 18 to 498.

IBM on Top for Sales

Ranked by sales, IBM led the computer industry representatives on the *Fortune* list, followed by Xerox in 39th place and Greyhound in 41st.

Sperry Rand rose nine places from 69 in 1974 to 60 this year, while Honeywell stood solid at 67. Despite an eight-notch drop, Singer ranked 73; in terms of net income, however, it ranked 493.

NCR was number 96 in sales, Burroughs rose 10 places to 124 and Texas Instruments ended up at 152.

Control Data Corp. rose 17 to 170; Hewlett-Packard gained 19 slots to 207, Digital Equipment Corp. jumped 63 places to 326 and Pitney-Bowes was at 369.

Tektronix ranked 457 in terms of sales but an impressive 280 in net income.

Varian was number 485; Nashua dropped 26 places to 491.

Bunker Ramo, listed as 467th in 1974, failed to make the 500 listing this year.

DEC Highest in Returns

With an industry median of 64.38% for total return to investors, which combines dividend yield and price appreciation, DEC ranked among the 10 highest in the total 500 listing, with a return of 169.7%. Nashua, on the other hand, led the low returns with -34.41% and ranked 477 in this area.

Among other industry representatives, IBM showed a return of 37.35%, for

(Continued on Page 86)

Independents Seen Unaffected By IBM Cuts in Memory Prices

By Molly Upton
Of the CW Staff

The recent IBM price reductions on MOS memory [CW, May 24] may well affect the independents' pricing on their 512K-byte memories, but otherwise the independents' pricing is expected to remain unchanged, according to Dick Bravo, general manager of systems equipment operations at Electronic Memories & Magnetics Corp.'s (EMM) Computer Products Division.

And IBM's announcement that it has increased the memory on its 370/115-2 and 370/125-2 (see story on Page 57) could create a market opportunity for the independents, he observed, noting EMM previously had not offered products for these machines since the expansion capabilities were so limited.

Bravo said he did not know of any independents currently wooing the 115 and 125 markets, but said he expects to see some considering this step.

Richard J. Egan, assistant general manager of Intel Corp.'s Memory Systems Division, said that firm is waiting to see users' reactions. It is also wondering what IBM's next step will be, he said.

Comparison of CPU prices and memories indicates IBM reduced the price of 512K MOS memory by 35.5% form $131,500 to $85,000, Bravo said. All other price reductions are based on this cut, although for various reasons the percentage of price reductions on CPUs and memories are not across the board.

In the larger memory sizes, the percentage and dollar drop are substantial.

(Continued on Page 88)

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IBM 360 Proved Nutrient for Software Market: Welke

By Edith Holmes
Of the CW Staff

NEW YORK – Before there could be software products and a software industry, there had to be a market for them, the president of International Computer Programs, Inc. (ICP) told the court hearing the U.S. vs. IBM antitrust case here recently.

Larry Welke said the concept of "software product" was not really feasible in the 1964-65 time period because a wide audience of users of compatible equipment had not yet been established.

The middle 1960s marked a transition period as users of IBM's 1400 equipment moved to models of the 360 series, and the creation of a large, homogeneous audience or marketplace for software products was under way, Welke said.

By 1968, wide user acceptance of 360 equipment gave life to the idea of software products, he stated.

It took until 1968 for 360 users to see their systems "settle down." By that year, 80% of the original 1964-65 systems had done so, although a few users didn't fully accept their 360 systems until as late as 1971-72, he added.

With wide acceptance of the IBM machines, independent software suppliers could design a program for the 360/30 and be assured it could be used on the entire 360 line, Welke said. Any user of the 360/30 and larger models could be a prospective customer for the software product.

In addition, the software seller could assure his buyer that the product was compatible with the larger 360s.

Fractured Market

For the first time, Welke said, software vendors had a large, potential market for their products. Before the 360 and its wide acceptance, the limited transferability of programs for other manufacturers' machines tended to fracture the market.

Software vendors spent their energies producing several different versions of the same solution to one problem, he said.

Maintaining that "the economics of profit depend on multiple copies of one design," Welke stated this fracturing of the market and of the efforts of independent software suppliers retarded the feasibility of the software products concept.

The notions of software products and of buying software also gained user acceptance as the complexity of equipment and programming increased, causing in-house programming costs to go up, he noted.

Welke testified during his first stint in court as a government witness over a month ago that IBM's 1969 move to unbundle its software and services from its hardware and price these elements separately further encouraged users "to consider software a product" [CW, May 3].

Support Paramount in Software

(Continued from Page 85)

nance and support services were theirs for the asking – and for the price of renting the hardware. They knew they would have a system that operated to satisfy their DP needs," he added.

The ICP president indicated it is this user reliance on services and support that makes software products "relatively price-insensitive, except where there is competition in that product's application area."

Welke stated he believes the software vendors will eventually follow in the footsteps of the systems manufacturers and price the elements making up their software products separately.

The process will, however, be an evolutionary one, he said, and it will depend on users becoming sufficiently mature to look at all elements of DP from a costs and an alternatives point of view.

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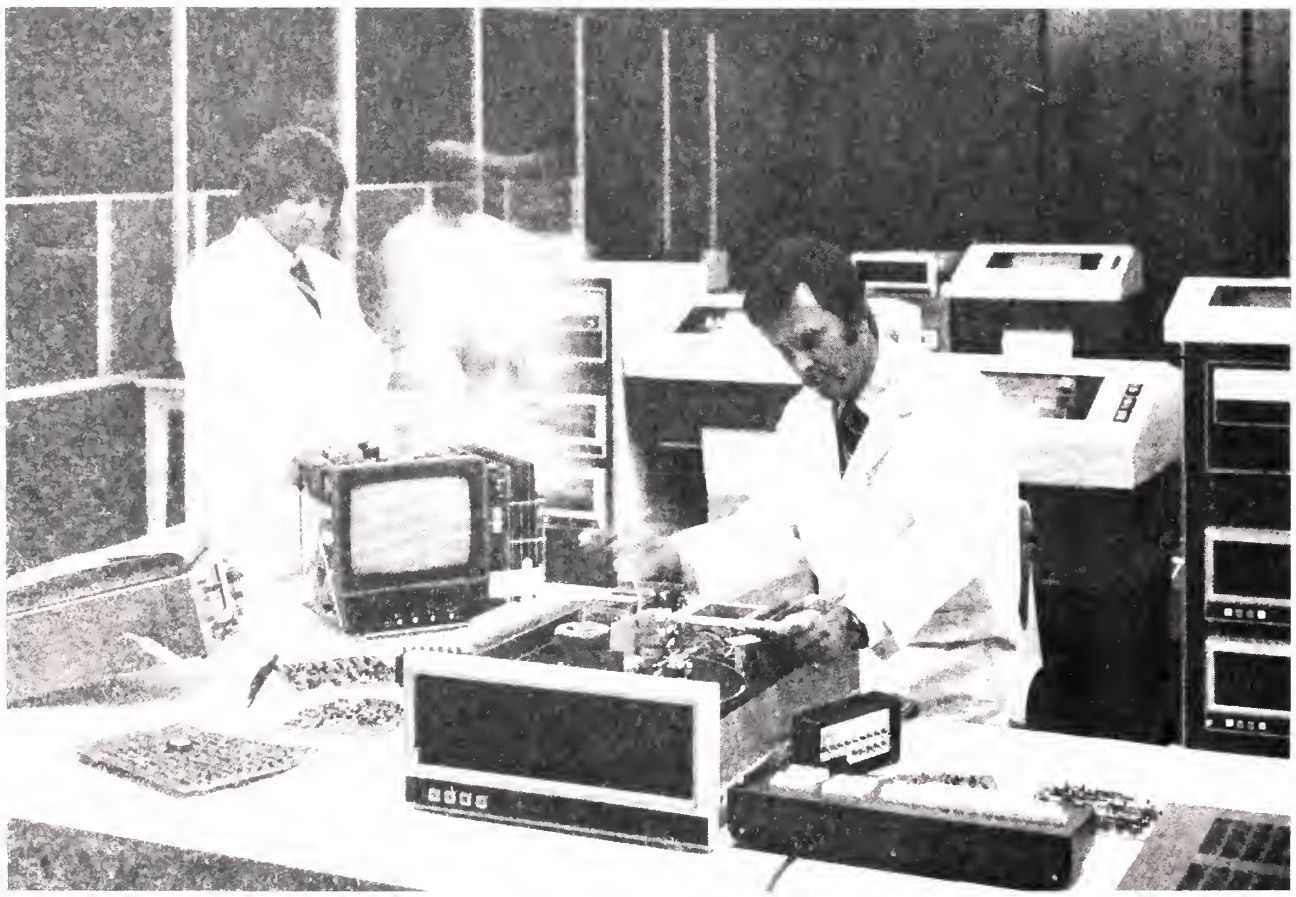

IBM Ranked Seventh In Fortune 500 List

(Continued from Page 85)

306th place; Sperry Rand 46.18%, Honeywell 65.63% and Singer -14.78%.

Newcomer Tektronix showed a return of 131.27% and Ball 71.38%.

Office equipment manufacturers, including computer manufacturers, had an industry median of 11.7% return on stockholders' equity.

Singer, which ranked 73rd in sales, was the year's leading money loser, with a loss estimated at $451.9 million.

Despite a poor overall sales record for the 500, two-thirds of the companies reported higher sales, including all but five industry groups. Office equipment, including computers, rose 11.1% for 1975, ranking seventh of 28 industry groups.

As a whole, sales for the 500 rose to $865 billion, an increase of only 3.9% over 1974, according to *Fortune*. In real terms, however, sales of the 500 actually declined in 1975 since the U.S. government's index of the price of manufactured goods rose by 11%, the article stated.

Expansions

Centronics Data Computer Corp. has expanded its West German subsidiary, **Centronics Data Computer GmbH**, into larger quarters at the same location.

– **Digital Equipment Corp.** will begin work this spring on a 275,000 sq-ft building in Salem, N.H., to expand final assembly and test capabilities centered in Westminster, Mass. It will also purchase a 100,000 sq-ft building in Maynard, Mass., for field service operations and plans to double the size of its 70,000 sq-ft Canadian headquarters in Kanata, Ontario.

IBM is building a 10-story office building in the Allegheny Center in Pittsburgh, Pa.

Prime Computer, Inc. plans a 70,000 sq-ft addition for its present headquarters building in Framingham, Mass.

Peripheral Dynamics, Inc., a manufacturer of card readers and other computer peripheral devices, will relocate its manufacturing and marketing operation to a new plant in Norristown, Pa.

Commerce, Cocom Ease Controls On DP Exports to Communists

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – The U.S. Commerce Department and the Free World Coordinating Committee (Cocom) have eased some of their export restrictions on computer systems sold to Communist Bloc nations to help standardize conditions under which exports can be approved.

The changes should not be interpreted as a signal that controls on DP equipment will be reduced overall, according to John Collins, who heads the Export Control Administration's Computer Division.

A two-tiered set of guidelines was issued. Equipment with performance specifications no greater than those cited on List A may be exported with approval from the Commerce Department alone.

Higher performance equipment, included in List B, requires approval from the Commerce Department, the Defense Department and in some cases other agencies, but is expected to get "favorable consideration," according to industry sources.

On-site inspection requirements were included with the new export terms, according to the Commerce Department's letter to nine manufacturers.

Those that received the letter were NCR, Data General, Digital Equipment Corp., Honeywell Information Systems, Hewlett-Packard, Varian Data Systems, Control Data Corp., Univac and IBM, Collins said.

List A Specifications

Only Commerce Department approval will be needed to export equipment with performance specifications that do not exceed the following:

- CPU process data rate of 13M bit/sec where floating-point operation is implemented by hardware or firmware.
- Internal memory speed of 4.72M bits.
- Effective bit transfer rate for peripheral memory of 1.6M bit/sec.
- Disk memory capacity of 1.9G bits.
- Disk memory performance factor (net capacity in million bits divided by the average access time raised 3/2 power) – 64,000.
- The sum of the I/O bus rate or the total effective bit transfer rate, whichever is less, and CPU rate of 60M bit/sec.

List B Specifications

Equipment that needs Pentagon approval and in some cases approval from other agencies includes those with:

- CPU process data rate up to 32M bit/sec.
- Internal memory up to 6.3M bits.
- Effective bit transfer rate for peripheral memory or data channel of 3.4M bit/sec.
- Disk storage of 3.2G bits.
- Disk performance factor of 135,000.
- The sum of I/O bus rate, or total effective bit transfer rate, whichever is less, plus the CPU bus rate equalling 90M bit/sec.

Approvals for equipment that exceeds the performance thresholds in both List A and List B has not been changed.

As for on-site inspections, systems with performance ratings that exceed those set forth in lists A and B would require on-site inspection once a month for two years and quarterly for four years, the letter said.

The guidelines also require the end-user or importing agency to file with the Export Control Administration a detailed end-use statement with each export request, Collins indicated, although many manufacturers consider such documents useless paperwork.

Despite the new guidelines, most DP equipment will continue to be controlled, according to sources who have seen an export control list scheduled for release soon.

While some CRTs with limited capabilities and other electromechanical printers have been removed from the controlled list, the controllers that link them with CPUs were not, one source said.

Disk Course Goes on Road

CHATSWORTH, Calif. – A traveling course on the maintenance of Pertec D3000 disk drive series will be offered in five cities this summer.

The Peripheral Equipment Division of Pertec Corp. is offering the five-day course in Boston, Philadelphia, Dallas, Atlanta and Chicago.

Further information is available from Norm Ohren, Pertec, 9600 Irondale Ave., Chatsworth, Calif. 91311.

Another Way to Record Images

SAN JOSE, Calif. – Three IBM scientists have discovered a reversible electrochromic effect induced by light.

The approach records an image by exposing a film to a laser beam and initiates the development of latent images by switching on an electrical field.

The images, formed on a transparent liquid film containing organic molecules of a class known as pyrazoline, can be erased if the direction of the field is reversed, according to an article in *Applied Physics Letters*.

Exposure of the liquid to a laser beam produces a faint blue-green image that becomes darker when a developing field is turned on.

The solution retains the color even after the field is removed. If the direction of the field is subsequently reversed, the developed image disappears, making the recording solution available for many cycles of use.

The discoverers are M.D. Shattuck of the IBM Office Products Division here and R.V. Pole and G.T. Sincerbox of IBM's San Jose Research Laboratory.

A resolution of about 300 line/in. was achieved. The pattern formed was made by turning a scanning laser beam on and off at points corresponding to the beginning and end of lines.

The possibility of recording information with a finely focused deflectable laser beam gives the photo-induced electrochromism approach a higher image-forming resolution than matrix-type electrochromic displays in which picture elements can appear only at points in a predetermined grid, according to IBM.

The image formed in the IBM experiments was a 2-in. by 2-in. line pattern commonly used for testing the resolution and reproduction quality of photographic equipment.

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Sees User Education as Priority

Qantel Plunging Into Distributed Processing Arena Soon

By Esther Surden
Of the CW Staff

HAYWARD, Calif. — Qantel Corp. will enter the distributed processing marketplace this summer, according to Noel O. Kile vice-president of marketing for the firm.

Qantel markets through distributors an upwardly compatible line of small business systems designed for end users.

The systems already have communications capabilities, Kile said, but Qantel previously lacked the expanded maintenance capability to compete in the distributed processing arena.

"We have built up a bread and butter first-time user business," Kile said, and the distributed processing area is a "technical marketplace."

Business is rapidly expanding at Qantel with a comfortable order backlog developing, Kile said, but he admitted the firm was not always in such good financial shape.

Qantel started six years ago as a communications processor manufacturer. When the firm found it had to support a large service organization while spending $300,000 on software and $200,000 on hardware to make the processors, a second phase was initiated to market small business systems, he said.

A lot of confusion exists among end users when they go to purchase their first minicomputer-based business system, he said. First-time users don't know what kind of language they should look for or what kind of capacity a system should have.

"Whoever walks into the marketplace and clears up the confusion will capture most of the market," he commented, adding one direction the Qantel is headed in is giving its salesmen the tools to help educate the prospect.

In the future Qantel may be moving toward some specialized industry areas for growth potential, Kile continued. The firm is considering several of these markets in which the systems have been found to work well.

Qantel has an installed customer base of about 500 systems, he estimated. The systems are software-compatible with each other and most peripherals from one can be used on the other, he said.

The compatibility of the firm's minis makes it easy for the user to upgrade, Kile said.

Qantel's philosophy is that the first-time user should make an investment in hardware, systems designs, programming, procedures and operator training which is not obsoleted by any of the firm's systems, he added.

The System 950 is the companies hottest selling item, Kile said. The system can run up to four jobs simultaneously and can accommodate printers with speeds from 45 char./sec to 600 line/min, he said.

IBM Price Cuts Won't Affect Independents

(Continued from Page 84)

he said. For instance, the price of a 4M-byte 158 dropped 10%.

On a 168 with 2M bytes, the drop was 9.86%, however, an 8M-byte 168 price dropped 13.3%, which amounted to a $651,000 reduction.

The price changes afford ample opportunity for speculation on why IBM chose this route, Bravo said. One possibility is that IBM is trying to encourage the purchase of 158s and 168s because the future systems are not as far off as some may have thought, he said.

The move could also be seen as recognition by IBM of its operating systems's voracious appetites for storage, he said.

On another track, Bravo opined that perhaps IBM is using its leverage on memory prices to become more competitive with other large mainframe suppliers such as Amdahl, Control Data Corp., Univac and Honeywell.

He doesn't see the price moves as attacks upon the independent memory makers with the exception of the 512K price.

"If I were to be real cynical and take my hard-nosed view of IBM's marketing strategies, I'd say it went out and looked at what the 512K was worth from independents and priced its the same."

IBM's new price on this unit is $85,000, which is what the independents have been charging, he said.

LMM is evaluating the IBM move and debating whether to cut its price on its 512K. Keep the price the same and probably not have any demand for the unit or take the unit off the market. LMM will not cut the price if it finds it cannot obtain an acceptable margin, Bravo said.

The 512K market does not represent a large share to LMM, since it has only one installed, he said. Most 158s will go to 1M byte when expanding memory, he said.

"We may want to adjust the 1M-byte number a little bit so it is more consistent with the decrease in the 512K price," he said.

Although the IBM price for a 1M-byte machine is now $170,000, which is "closer to LMM's normalized prices, it isn't so close that we'd consider changing it," he said. "We're still less than 80% of the IBM price.

"The only thing we worry about is when [IBM is] going to do it again."

In its pricing, IBM multiplies the 512K unit price by four for a 2M-byte unit whereas LMM, for example, has a discount as the increment increases.

"Our pricing is a function of the total amount of memory you buy from us because you put the memory in the same box. So we don't price 1M byte at twice the 512K price, we price it at something like 90% or 80% of that."

One reason the price reductions don't appear constant is that IBM charges a $56,400 fee for increasing a 158 above 2M bytes and there is an $11,600 fee for a port above 2M bytes on the 168, Bravo said.

Above 4M bytes, the 168 owner pays $56,400 for alterations, he added.

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Sycor Directing 440 to Distributed DP System Users

By Molly Upton
Of the CW Staff

ANN ARBOR, Mich. — Although Sycor, Inc. is offering Cobol on its 440 clustered system, it is not directing the product to the small business market, according to the vice-president of marketing, Paul C. LaVoie.

Instead, Sycor is pursuing users in its traditional field of distributed data entry and processing, he said.

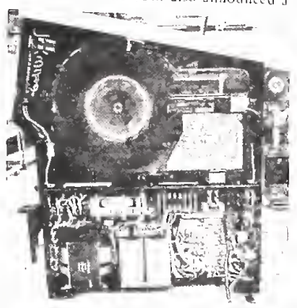
However, there may be some OEMs to whom the added Cobol capabilities are attractive, he remarked.

At the firm's annual meeting, President Samuel N. Irwin said he expects 1976 earnings and revenues to grow about 30% compared with those in 1975.

Shipments of the 440 are expected to reach 40 to 50 systems a month in June, Irwin said.

LaVoie said he expects most 440 installations with Cobol to use it for report generation, although the system could operate as a stand-alone processor, he said.

In addition, the firm also announced a 10M-byte disk of its own manufacture for the 440. Sycor sees customers wanting to put more applications and files at remote sites to interact with on a local basis.



Control Unit for Sycor 440

While a lot of people are talking about distributed processing, "we're fine tuning that a little bit," LaVoie said. "We're saying to a large extent the needs are filled with something we call transaction processing."

The additional 10M bytes is to help users who address themselves to transactional processing to meet growing needs.

Line entries are edited using Sycor's Lil language, and then the locally retained files are updated.

The firm also added two more floppy disk drives to the 350 for a total of 1M bytes of file space.

Evaluating New Concepts

Sycor is evaluating new concepts in floppy disk technology, including double-sided recording, but "we're not taking any action at this time," he said.

Shipments to Olivetti account for about 45% of revenues, and this figure is decreasing as the firm's lease base increases and its domestic marketing force grows, he said.

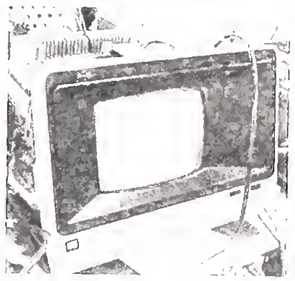
About half of Sycor's installed systems communicate with central computers, whereas the others communicate between other Sycor systems, he said.

CW Photos by M. Upton

Printer being assembled is used on terminal units and prints at 60-, 120- or 180 char./sec.

Order input for the 440 is "exceptionally strong" and the 350 and 250 are strong and very strong, he said.

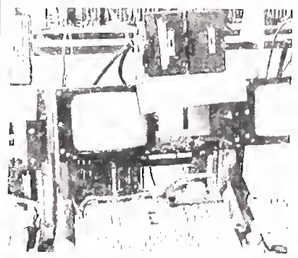
Most revenues are still associated with batch-oriented systems such as the 340, 350 and 440, he said, and the mix has not changed appreciably.



255-2 Stand-Alone Terminal

Sycor also has the 215, which is an IBM 3270-compatible device. Order input and shipments for the first four months for the 215 have also been strong, he said.

Sycor aims for a slightly different user than IBM, he said, in that the user anticipates using the 215's microprocessor to increase the editing power. This could reduce errors and the requirement for retransmission of error blocks over the line, he said.



350s run diagnostics with floppy disk units.

"For instance, the first application may be inquiry response, but the user is looking toward utilizing the device for data entry," he said. Sycor can also put a floppy disk on the system, he observed.

Distributed processing, as LaVoie sees it, is an offloading of editing tasks and working files to remote sites where the user is anxious to exercise more control over his operations.

(Continued on Page 90)

Head-Per-Track Disk Carving Niche in Mini Mart

By Esther Surden
Of the CW Staff

CHATSWORTH, Calif. – The head-per-track disk has carved its own niche in the minicomputer add-on memory market, according to L.T. Lincoln, director of marketing for Alpha Data, Inc., an eight-year-old company marketing these disks.

The head-per-track disk has a place between floppy disks and moving-head disks in capacity, but is more reliable than either, Lincoln said.

"The industry will change in the next year," he predicted. Among the changes he forecasted were a move toward greater capacity through higher packing densities.

"People who buy our product need a faster access time, reliability and a fairly large capacity," Lincoln said.

"We don't even look at areas where there is competition with the moving-head disks," he said. "Forty million bits is our largest capacity while 40M bytes is nothing for a moving-head disk," he said.

Moving-head disks have slower access times, however, and "many applications cannot take a slow access time." Such applications include communications.

A large program that resides in moving-head disk can use head-per-track disk to give it increased throughput, Lincoln said.

Part of the program is swapped into head-per-track and, when finished, it is swapped back into moving-head memory, Lincoln said.

Alpha Data's business is 70% to 80% OEM with the remaining end-user, Lincoln said.

The firm clearly prefers to deal with the OEM customer because, Lincoln said, "you have to hold [end users'] hands."

Most end users want the supplier to provide the disk controller as well, he added, and, although Alpha Data will supply the controllers, it isn't in the controller business, he said.

Business this year is better than a year ago, Lincoln added. "There's been a general pick-up of interest," he added. "We've had some things going for several years that are finally coming through," he continued.

A good number of the firm's sales are in the refinery and geophysical industries, Lincoln added. The Alpha Data disks will work in hostile environments because of an enclosed chamber and a retractable head design. "Everyone else uses contact start and stop," he said.

The only moving parts were two bearings, Lincoln added. Microprocessors don't have too much of a posture in the disk arena, Lincoln said, because Cmos is too slow. "We are looking at faster chip technologies, however." Microprocessors do have a place in the controllers, he added.

"Now, I could make a million if I could make a low-cost head-per-track disk" as peripherals for microprocessors.

The problem with most microcomputer peripherals is that they are miniperipherals and are electromechanical in nature. "I don't see low-cost peripherals for micros in the electromechanical area in the near future because labor keeps going up and parts keep costing more."

An additional product marketed by Alpha Data is a disk exerciser designed for the firm's disks. "The tester could take off heavily," in the next year, Lincoln said.

The firm also makes an integrated circuit tester to evaluate Cmos, TTL and DTL circuits, he said.

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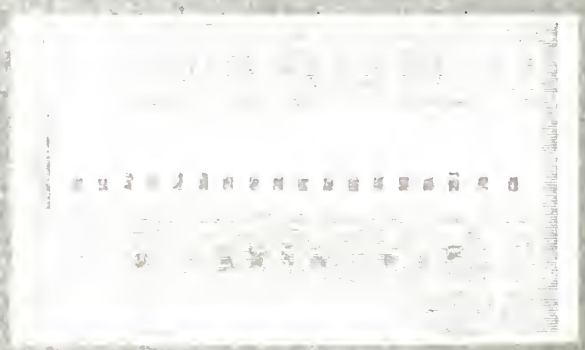

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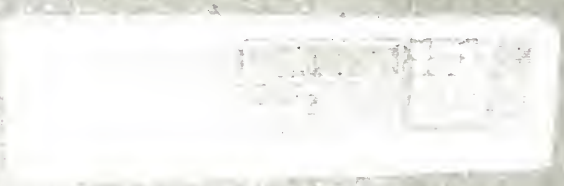

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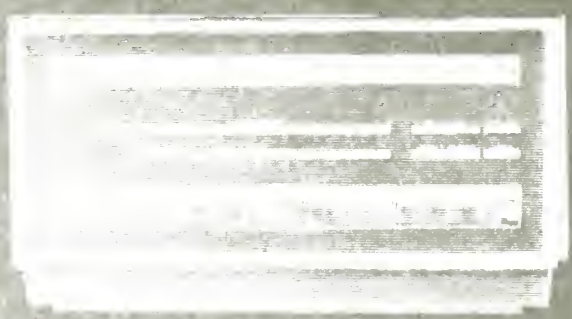

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Distributed DP Target of 440

(Continued from Page 89)

While central DP probably wants to lighten its load, distributed processing now does not necessarily include taking a stand-alone application like accounts receivable, payable or payroll and doing the whole job out there, he said.

"I think corporate headquarters is going to want a certain amount of control. Yet the equipment most vendors are supplying to this market is capable of doing those jobs. It's a sporty course," he said.

Other contestants in the distributed area are IBM, which is now advertising distributed processing with the 3790; Four-Phase Systems, Inc.; and Datapoint Corp. Still others in the arena are the mini companies.

Raytheon, Intersil Settle Litigation

LEXINGTON, Mass. – Raytheon Co. and Intersil, Inc. have settled out of court the long-pending litigation between them.

Under terms of the agreement, Intersil was granted a paid-up license to use without limitation all the semiconductor technology which was in dispute.

As a royalty payment for that license, Raytheon will receive a total of $500,000, payable over a four-year term. As an additional royalty, Raytheon will receive 120,000 shares of Intersil stock which Intersil may be obligated to purchase at a price of $10 per share between 1978 and 1983.

Orders & Installations

Tennessee Forging Steel Corp. has installed a Burroughs B1726 to handle DP requirements for its three plants.

Brown Oil Tools, Inc. has installed a Burroughs B1726. On-line real-time production information will be handled through the Burroughs Production Control System and on-line order entry and accounts receivable inquiries will be achieved through the Burroughs On-Line Wholesale Distribution System.

Minneapolis' Red Owl stores have ordered Datachecker T-2500 and T-3000 electronic cash registers from National Semiconductor Corp. for 17 of its locations.

The SCM Corp. and General Electric's Transformer and Distribution Equipment Business Division have ordered factory data collection systems from Sierra Research Corp.

Sun Oil Co. has installed a Control Data Corp. Cyber 172 system.

Bernalillo County, N.M., has installed a Honeywell Model 6023 system for the tax assessor's office.

Raychem Corp. of Menlo Park, Calif., has installed two Burroughs B6700s, replacing a B4700 and some purchased computer time.

Ortloff Corp. has ordered a Univac 1100/10 computer system for project management, engineering design and general accounting applications.

The Air Force Military Personnel Center has installed a Grumman Data Systems Corp. printer controller which enables its Burroughs B6700 to interface with an IBM 1403-N1 printer.

Sun Chemical Corp. has ordered a Honeywell Series 60/Level 66 large-scale computer system and a Series 707 minicomputer.

San Diego City Schools has installed the first Telex 6330-11 direct-access storage system.

Computer Data and Optical Coating Co. have each ordered a V76 system from Varian Data Machines.

Ruppman Marketing Services, Inc. of Peoria, Ill., has installed a Burroughs B700 with Burroughs Business Management System program products.

The Associated Colleges of Central Kansas has ordered an S210 computer system from Harris Computer Systems for instructional, research and administrative purposes.

The Defense Mapping Agency (DMA) has ordered Staran processing equipment from Goodyear Aerospace for use by the Army's Engineer Topographic Laboratories to perform research for the DMA in cartography, digital photogrammetry and image processing.

Collett's Furniture, Inc. of Salt Lake City, has installed a Burroughs B1700 for inventory control, merchandise management and accounting functions.

The Texas Water Development Board has ordered a computer graphics DP system from Digital Resources Corp. to aid in the state's water resource planning and management.

Medical Data Services, Inc. has installed six Microdata Reality minicomputer systems and has ordered three more for use in clinic data processing.

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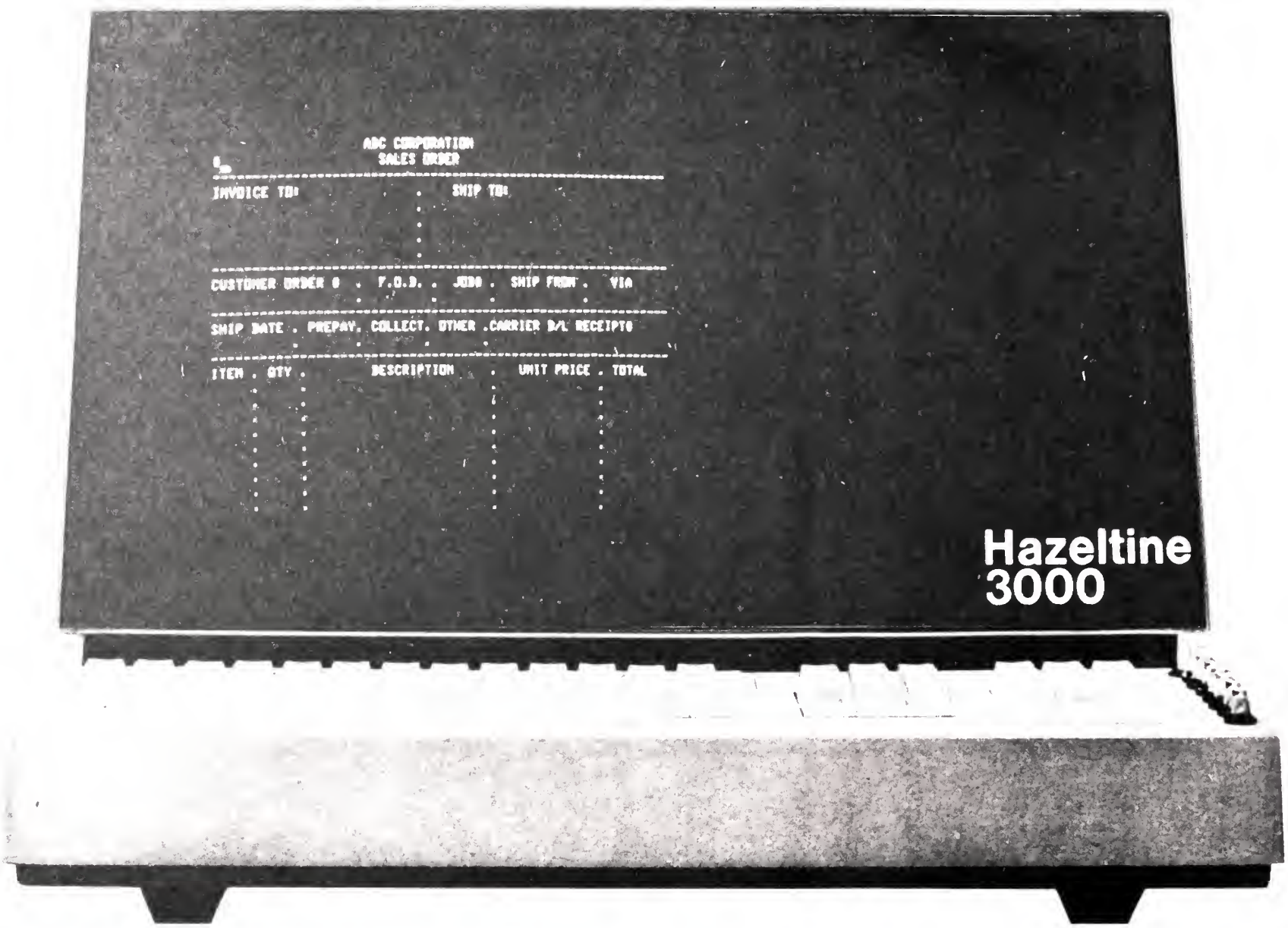

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CIRCULATION DEPARTMENT

Sees Costs Dropping

Tally Continues Emphasis on 300 Line/Min Printers

By Molly Upton
Of the CW Staff

BOSTON – Tally Corp. intends to continue its concentration on the 300 line/min and under printer market, which it expects will experience rapid growth but also increased cost competitiveness, according to President Leslie A. Larsen.

The firm will exceed, but not double, the growth rate in this area of the printer market, he told analysts at a recent meeting here.

Tally is gaining in market share, but not substantially, he said, adding he expects to see increased competition in the 200 line/min niche.

In turn, Tally has entered products such as its 120 char./sec and 300 line/min printers into other manufacturers' areas, he observed.

The future market will be characterized by demand for less expensive, more reliable printers, he said, adding the product "we sell for $3,500 will be $3,000 by the end of 1977."

Technologies Cutting Costs

Larsen believes the comb and serial matrix technologies incorporated in its printer products are lower cost and provide greater opportunity for profits than some other types of printing techniques.

In the past year Tally has cut costs on its T2000 by over 20% and has an in-house campaign to reduce costs by $5/week.

Its vertical integration and incorporation of the interface on the T1000's microprocessor are helping in this effort, Larsen said.

Other units will use microprocessors within a year, he added.

In addition to offering interfaces, Tally has emulators to make its printers look like those of other manufacturers. This enables users to change printer suppliers with a minimum of work, he added.

Larsen predicted that Tally's future products in the near term will come from an evolution of present products and that the firm will not venture into other product areas within the next two years.

Tally will derive about 75% of revenues from printers and printer supplies this year, he said. The firm also makes punch tape machines and key-to-tape units.

Tally has reduced its line of punch tape products to two, which should help increase profitability, he said. Two years ago paper tape business accounted for 25% of revenues, but this figure is now about 8%.

Recently Tally expanded its line with a serial printer, the T1000, which operates at 120 char./sec. Tally has a license from General Electric to manufacture the printer, which is currently being made in Italy, he said.

Tally has also announced the T4300, a 300 line/min printer using the same comb technology as the 200 line/min unit that comprises most of its installed base.

The comb technology can be the basis for an even faster printer, "but we are questioning whether we want to go faster than 300 line/min," Larsen said.

"Comb technology is extremely cost/effective in the high-speed range. The question is, is the market there?"

Although it could go slower than the 200 line/min, it is not cost-effective to do so, he added.

Larsen doesn't see encroachment from new technologies such as laser printing in the low-speed area – "certainly not for the next three years and probably not for five."

Doubts on Joint Ventures

Larsen expressed doubts about the long-range competitiveness of products from joint venture firms formed as part of the trend by mainframe manufacturers to vertically integrate operations.

Generally they start out with a good product but don't follow up well, he said, adding good management tends to be transferred into the main part of the company rather than staying with the printer or peripheral unit.

In addition, these units plan products according to the mainframer's specifications. But when product introduction time comes, the products often are not as competitive as what may be available from independents, he said.

About 55% of Tally's business in 1975 was overseas, and Larsen expects the same proportion this year.

The firm has 570 employees, with about 80 of these in Europe.

TRW to Help Distributors Gain Low-Rate Financing

LOS ANGELES – TRW Datacom International, Inc. has begun a program to help its worldwide distributors obtain financing at low rates, the firm said.

"TRW, with its international resources and international financing experience, can help its distributors get 180-day financing below prevailing rates in their own countries," according to James L. Kelly, vice-president of operations.

"We will assist the distributors in finding sources of financing and different mechanisms of financing at attractive rates which can be substantially below their own country's."

Piore Gets NAS Post Again

WASHINGTON, D.C. – Emanuel R. Piore, retired vice-president and chief scientist and a current member of the board of IBM, was reelected to a third four-year term as treasurer of the National Academy of Sciences (NAS).

Shippers Form Service Firm

NEW YORK – The American Bureau of Shipping has formed ABS Computers, Inc. (Abscomp) to provide services for both the parent firm and others.

Abscomp has an IBM 370/158 and is offering a range of services ranging from business accounting to engineering calculations and mathematical analyses, a spokesman said.

The firm is at 45 Broad St., New York, N.Y. 10004.

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Aims at Technological Advantages

SI Finds Niche in Mini Disk Market

By Esther Surden
Of the CW Staff

SUNNYVALE, Calif. – "I would start worrying about the future of disk technology when IBM starts peddling an alternative," Kent Winton of System Industries (SI) said in an interview here recently.

Most people wait until IBM legitimitizes the market, he added.

SI got into the minicomputer-compatible disk storage system market in 1970. "We really got into it because we wanted to use a disk ourselves," Winton said.

The company offers fixed and movable head type systems to Digital Equipment Corp. and Data General Corp. users, with a large part of its business aimed at first-time users.

"We also satisfy a narrow band of users – those too small to build their own electronics and those too big to take what the manufacturer sells them at a premium," Winton said.

More Aggressive

The company considers itself more aggressive in forging technological advantages than a mini firm that makes its own drives.

"Minicomputer manufacturers don't want to obsolete their investment," so they don't take the technological initiative, Winton explained.

IBM is doing a lot of worrying about DEC, Winton said, because IBM has always tried to get the customer his first computer.

SI's biggest customers use systems in business applications, Winton said. They are "OEMs in every sense of the word except they don't resell the equipment," he added.

Other large customer applications include use in the military and in text-editing systems, he said.

Winton predicts larger capacity disks in the future with more bits written on the same amount of space. "Within two years we'll find a single-spindle disk with a 1G-byte capacity," he added.

The company has little trouble getting customers to understand the mixed-vendor environment because "historically the people who grew up in the mini world are conditioned to think about more than one vendor," he said.

Lambert Firm to Make Newspaper Systems

MIAMI – Clark M. Lambert, a DP executive for *The Miami Herald* and Knight-Ridder Newspapers, Inc. for the past nine years, has resigned in order to form his own company, Circ, Inc.

The firm will develop, sell and install mini-based circulation systems for small and medium-sized newspapers, he said.

N.Y. Asks AMS to Design Systems

NEW YORK – The City of New York has awarded a $1.4 million contract to American Management Systems, Inc. (AMS) for the general design of computer-based accounting and financing management systems.

AMS has been asked to design a city expense budget structure and related control procedure, a payroll system and a citywide accounting system. The systems will be based on concepts developed by AMS in earlier work done for the city.

AMS will undertake design of the systems as a part of the city's Integrated Financial Management Task Force.

Other Awards

Scientific Micro Systems obtained a five-year contract from Western Union Data Services Co. to develop and manufacture advanced terminal control units.

Tri Data Corp., has received a $1.1 million contract from Teradyne, Inc. for its Cartrifile magnetic tape systems for use in Teradyne test systems.

General Systems International, Inc. (GSI) has received a development and leasing contract worth more than $1 million from Siemens AG for further development of the GSI 740 and GSI 540 key-to-diskette terminals, which are replacement units for the IBM 3740 and 3540 CRTs.

Paradyne Corp. has been awarded a $5.2 million follow-on production contract from the Data Transmission Co. (Datran) for 4,800- and 9,600 bit/sec LSI modems to be used in the Datran communications network.

Pertec Corp.'s Peripherals Equipment Division has been awarded a contract from Applicon, Inc. for digital magnetic disk drives.

Burroughs Corp. has been awarded a $3.5 million contract by the U.S. Coast Guard for the installation of the Mississippi River Vessel Traffic Service, a communications network, in New Orleans.

General Instrument Corp. has received a contract from the Maryland State Lottery for a computerized daily lottery system. The company's American Totalisator subsidiary will install

Contracts

and operate the system; about 300 ticket-issuing terminals will be placed in the state.

Two divisions of Western Union, Inc. – National Sharedata Corp. and Distronics Corp. – have received extended facilities and service contracts from First Wichita National Bank and Water Control Products/N.A., Inc. respectively.

Western Union Data Services has received a three-year contract from Keydata Corp. for the maintenance of Keydata's 800 terminals.

Comshare, Inc. has been awarded a long term services contract from A.B. Dick & Co. to use the Comshare system for on-going applications in financial analysis, budgeting, sales reporting and quality control.

Comshare, Inc. has also received an estimated $1 million, two-year contract from Manufacturing Data Systems, Inc. to provide a second Xerox 940 computer system for dedicated service.

Inter-Continental Computing, Inc. has received a three-year contract from the South Carolina Credit Union League's DP affiliate, Cuac, Inc. for remote computing services.

Computer Sciences Corp. (CSC) has signed an initial three-year contract with Gardner-Denver Co. to provide automated services on CSC's Infonet network and to develop a system of computer programs and a data base to automate Gardner-Denver's order entry and distribution functions. CSC has also received a contract from Day & Zimmerman, Inc. to automate a materials-handling system.

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Using Government Formula Helps Dealers Set Prices

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – In government bids, the equipment dealer who consistently loses to the competition or ends up selling equipment outright when he really prefers to lease it probably doesn't analyze his prices the way the government does.

Many used DP suppliers never actually determine whether the lease plans they are offering the government are actually cheaper than the purchase plan over the systems life of the gear, Terry Miller, president of Government Sales, Inc., told a group of used equipment dealers here.

To estimate the actual cost by a discount factor of 10%, used to represent the cost of capital, for the entire "systems life" or, in other words, the period the agency wishes to use the equipment. Then the results are compared, Miller said.

For example, assume Agency X wishes to acquire a system for use over a six-year period and is offered four bids for the same type of gear:

- Plan A. A straight purchase plan, at $610,000, with a maintenance contract of $29,670/mo.
- Plan B. A lease to ownership plan with title transferred at the end of six years, at $12,000/mo., maintenance included.
- Plan C. A straight six-year lease, at $11,000/mo., maintenance included.
- Plan D. A lease with option to purchase after 18 months with 80% rental credit, at $13,000/mo. Maintenance is included until purchase option is exercised. Thereafter, maintenance is $29,670/mo.

Plan B is most attractive to the government, he said, and explained how the government would reach this conclusion.

In Vendor A's purchase plan the full price is paid at once, and maintenance is the only annual cost to be considered, Miller said. Since the vendor offers free maintenance for the first 90 days, maintenance costs only $22,253 that year, bringing the total cost over six years to $780,603.

But that's not how the government reads the numbers, Miller explained.

Government's Method

Instead, a federal agency would multiply that annual cost by an adjustment factor: .909091 for the first 12 months, .826446 after 24 months, .751315 after 36 months, .683013 after 48 months, .620921 after 60 months and .564474 after 72 months.

The adjusted total for the purchase plan is thus only $732,479 – quite a bit lower. In addition, this purchase plan offers the government a bonus – the residual value of the system at the end of its "systems life," he said.

The residual value is determined by multiplying the original purchase price by 20% and then by .564474, the adjustment factor after its sixth year of systems life. ($610,000 x .20 x .564474 = $68,866). This figure is then subtracted from the adjusted total revealing that the cost of this plan is more attractive – $663,613.

Lease to Ownership

In the case of lease to ownership, offered by Vendor B, the costs are the same each year – ($12,000 x 12, or $144,000).

When multiplied for six years in a row, the total cost is $864,000. However, when multiplied by the adjustment factor, the total cost is reduced to $627,157.

This plan, too, results in government ownership of the equipment, so residual value must be considered, as in the outright purchase plan offered by Vendor A. This calculation is done as indicated above, reducing the final cost to $558,291.

This is the typical plan offered by IBM, Miller explained.

The straight six-year lease, at $11,000/mo rent including maintenance over six years, offered by Vendor C, would cost $792,000. However, after multiplying the annual expenditure by the government's adjustment factor, the price is reduced to $574,896. There is no residual value since the vendor still owns the system, Miller explained.

Lease With Option to Buy

In the case of the system offered by Vendor D at $13,000/mo lease with an option to buy after 18 months, the figuring is a little more complex, according to Miller.

Assuming the same $610,000 purchase price, one might multiply the monthly rent of $13,000 by 18 and multiply the result by 80% to determine the credit the government could subtract from the original $610,000 purchase price and find the government could convert for $412,800.

Adding maintenance charges for the balance of the six-year system's life would give an unadjusted total of $790,315, more expensive than the purchase plan.

However, the government adjusts that figure to determine its true cost by multiplying the first year's cost by the adjustment factor (12 x $13,000 x .909091).

It then multiplies the second year's cost of $515,635 ($78,000 rent + $412,800 purchase conversion + $14,835 maintenance x .826446).

For the four subsequent years of the system's life, the government multiplies the annual maintenance cost of $29,670 by the adjustment figures mentioned above with the resulting cost of $645,690.

However, still to be considered is residual value, which the government figures as 20% of the original cost multiplied by the adjustment factor stipulated for the last year of the system's life (.564474) or $68,866.

The final cost to the government of this plan is thus reduced to $576,824 – a far better price than the straight purchase plan, he explained.

The $68,866 in residual value, computed as above, brings the cost down to $588,291.

Month	Factor	Month	Factor
00	1,00000	60	.620921
06	.953463		
12	909091	72	.564474
18	.866784		
24	.826446	86	.505071
36	.751315	92	.481566
48	.683013		

End-of-month discount factors based on 10% annual cost of capital are listed above.

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On-Line Bank Net Seen Opening Japanese End-User Mini Market

TOKYO – Minicomputer suppliers are vying for one of this nation's most lucrative computer markets – the banking industry.

The National Credit Bank Association's data communications system, an on-line clearing system for bills and drafts, is scheduled to be inaugurated in October under the operation of the Nippon Telegraph and Telephone Public Corp. (NTT).

The system will connect more than 400 credit banks throughout the country with the association's headquarters here via private communications lines.

In line with this system, some 200 credit banks are expected to install minicomputer systems, the largest demand ever received for minicomputer systems in Japan, according to *EDP/Japan Report* (EDP/JR).

This is particularly significant since less than 50% of the total number of minis distributed in this country annually are to the end-user market and the remaining units are delivered either to OEM or other makers in the form of system components, which are more vulnerable to changes in the economic climate, EDP/JR said.

Minicomputer sales have suffered from a sluggish business year, largely because of a sharp decline in OEM business.

Winning banking orders will result in a considerable amount of credit for computer vendors for use in penetrating the business-oriented user market.

Software Development Minimal

Secondly, the type of application of the bank system is relatively simple and straightforward, requiring minimum software development. This should result in maximum profits for the vendors, EDP/JR said.

In addition to these benefits, the credit bank system is expected to offer unusually good opportunities for the penetration of foreign minicomputers into the semigovernmental computer project.

Minicomputer industry sources expect about half of all the 484 credit banks with outstanding deposits ranging from $66 million to $333 million will decide to use minicomputers, EDP/JR stated.

If all of the 200 or more credit banks with outstanding deposits in this range should install minis, the total value of the systems purchased will come to approximately $10 million.

At least four foreign suppliers are planning to participate in the bidding, including IBM with its 3/10 and System 7, Burroughs with its L2000, DEC with its PDP 11/40 and Phillips with its P300.

Domestic suppliers seen vying for the contract include Oki (Okitac 4300C), Hitachi (Hitac 10II), Nippon Electric Co. (M4/F) and Ricoh (Ricom 10S), among others.

International News

Foreign Orders & Installations

The Kao Soap Co. Ltd. of Japan has ordered a Univac 1100/21 to become part of its information system, which is used for integrating on-line physcial distribution, order entry and automated warehouse system.

Massey-Ferguson Industries Ltd. of Canada has ordered an IBM 370/158.

Pio Istituto S. Spirito Ed Ospedale Reunite di Roma, a group of eight hospitals in Rome, has installed a Univac 1106.

Centrais Electricas de Minas Gerais S.A., a Brazilian hydroelectric generating station, has ordered three HS4400 process computers from Honeywell to monitor six hydro-generating units.

Nippon Airways Co., Ltd. of Japan has ordered a Univac 1100/3 multiprocessor system.

Kingston-Sutton Joint Computer Committee, the computing center for the city governments of Kingston and Sutton in England, has ordered the Source Program Library Maintenance System (Slick) from National Computing Industries, Inc.

Trade Show Slated in Australia

WASHINGTON, D.C. – An exhibition designed to provide U.S. computer and peripheral manufacturers with a springboard from which to penetrate the Australian market has been announced by the U.S. Department of Commerce.

The exhibit will be held Nov. 8-12 at the U.S. Trade Center in Sydney, Aust.

Commerce has identified several high-potential markets with the Australian market including minicomputers, storage equipment, peripheral controllers, data transmission equipment, I/O devices, terminals, communications processors and interface devices.

The Australian computer/peripheral market is currently valued at over $211 million. The U.S. is Australia's leading supplier with a market share of approximately 50%, according to a Commerce report.

However, this market is served by a large number of suppliers with the result that competition is intense, Commerce said. The UK is the major competitor, with West Germany and Japan strong in specific areas.

In order to maintain the U.S. share of the import market sector, which is growing at 20% annually, aggressive marketing is required, the report stated.

Production is negligible in New Zealand, Commerce said. Consumption during 1974 was about $14 million, of which the U.S. contributed about $4.2 million. An annual growth rate of 10% to 15% was predicted.

Additional information concerning the exhibition is available from the Office of International Marketing, DIB-233, U.S. Department of Commerce, Washington, D.C. 20230.

Nippon Modems Hit $33 Million

TOKYO – An estimated $33.3 million worth of modems were in operation in Japan at the end of 1975, according to *EDP Japan Report*.

Nearly half were provided and operated by the Nippon Telegraph and Telephone Public Corp. (NTT), the newsletter said.

Of the total non-NTT modem population, 80% were provided by domestic makers, which specialize in medium- to low-speed units operating at less than 2,400 bit/sec; the remaining 20% were from foreign suppliers, who dominate the high-speed market, the report said.

Among these foreign suppliers, Codex Corp. and International Communications Corp. maintained top shares, and industry observers estimated Codex will increase its share this year with its LSI series.

Cincom Signs New Brazilian Rep, Sues Old One

By Eric Hippeau
Special to Computerworld

RIO DE JANIERO, Brazil – A Rio-based software vendor and consulting firm, Sistemas, Computacao e Informatica (SCI), has become the new Brazilian representative for all Cincom Systems, Inc. packages after the U.S. software house filed against its former representative, Deltacom do Brazil of Sao Paulo.

Industry sources said Cincom is charging Deltacom with breach of contract and failure to remit royalties.

Deltacom "could owe Cincom as much as $500,000," the source said. The suit has been filed in Sao Paulo; Deltacom spokesmen were not available for comment.

Under the contract signed March 23, SCI pledged to support and maintain all existing Cincom systems sold or rented before Jan. 16, when SCI first announced its association with Cincom.

According to Luiz Carlos R. Siqueira, SCI software vice-president, there are about 50 Total data base management packages installed in Brazil, but neither SCI nor Cincom knows exactly how many systems were placed by Deltacom.

International News

Siqueira is currently trying to locate those users in order to assure them of support and maintenance.

Royalty Payments

SCI and Cincom seem to have found a solution to the problem of royalty remittances, which has been causing headaches to a number of different software vendors in Brazil.

Under the arrangement, Cincom has incorporated a Brazilian subsidiary which will receive SCI's royalty payments – usually about 50% of the price of the software – in cruzeiros (the Brazilian currency).

In this way, SCI will not have to make any dollar transfers to the U.S., simplifying bureaucratic requirements and helping Brazil's balance of payments, Siqueira said.

For its part, Cincom will consider royalty payments made to its Brazilian subsidiary as a local investment, Siqueira said. This capital will be used at a later date in a possible three-way association between Cincom, SCI and the Brazilian government to develop a Brazilian software industry, he said.

ICL Sets Strong Plan For European Growth

PARIS – International Computers Ltd. (ICL) can be 100% on the offensive since its market share in Europe is a small 3%, according to Roger Houbert, head of ICL Europe, who noted that France is ICL's most important market, followed by Sweden, Germany and Holland.

Celebrating the delivery of its 1,000th Model 2903, ICL revealed revenues of $80.9 million, a profit of $7.3 million, a staff of 1,550 employees and an installed base of $368 million worth of equipment is the game plan for 1976.

In 1975, revenues were $69.9 million, Houbert said.

A feature of ICL growth in Europe has been the increase in revenue per employee, which more than doubled between 1970 and 1975 and is expected to nearly double again by 1980, when profits will be about $29.4 million, according to a report by *EDP/Europa Report* (EDP/ER).

ICL's key product in the European market is the 2903, of which 299 have been installed and another 129 are on order. Sales of 2903s in 1976 are expected to represent $29.4 million out of total sales of $80.9 million, EDP/ER said.

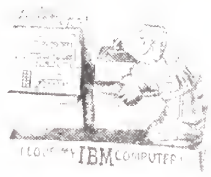
DEC Studying Possibility Of Manufacturing in Brazil

By Eric Hippeau
Special to Computerworld

RIO DE JANEIRO, Brazil – The Brazilian subsidiary of Digital Equipment Corp. has negotiated two high-level market studies worth about $50,000 to determine the viability of manufacturing or assembling DEC equipment in this market, according to Digital Equipment Ltd.'s general manager, Jarry Hays.

A Brazilian manufacturing or assembly plant is the solution to the government-imposed stiff import restrictions on all DP equipment passed last December, Hays said.

Besides producing for the local market, the plant would also generate about $20 million a year of export orders from the rest of Latin America and Japan, according to Hays' estimates.



DEVOTED DPER

This gold-finished plaster sculpture symbolizes the DP professional's computer fixation. Six inches long, this hefty paperweight-conversation piece is priced at $9.95, postpaid, from Brian Productions, 2949 Southfield Rd., Xenia, Ohio 45385. Satisfaction guaranteed.

RELIABILITY The Consul 980A is backed by ADDS' quality control, NCR's worldwide service network and an inexpensive extended warranty option that lengthens standard 90-day coverage to two years.

ADDS
CONSUL 980A

HARD COPY The Consul 980A allows local control of the printer interface: an entire screen of data can be printed at speeds up to 165 characters per second.

SECURITY KEYLOCK Available on competitive terminals only as an extra cost option, a security keylock is standard on the Consul 980A.

FUNCTION KEYS Thirteen program attention and eleven program function keys allow the Consul 980A to be tailored to your application.

NUMERIC PAD The Consul 980A's numeric pad is styled like an adding machine for rapid entry of numeric data.

EDITING Cursor control keys can be used to position the cursor up, down, forward, backward and home. The Consul 980A's operator can also insert and delete by character or by line and erase the entire screen.

ADDS Applied Digital Data Systems Inc.
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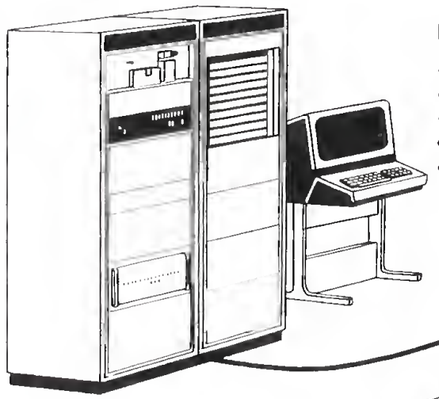
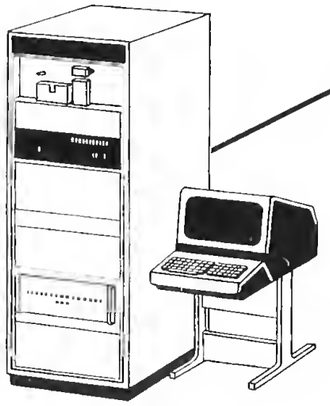
See us at the NCC Show—Booth No. 1219

There's been a lot of talk about computer networks. Hewett-Packard's speaks for itself.



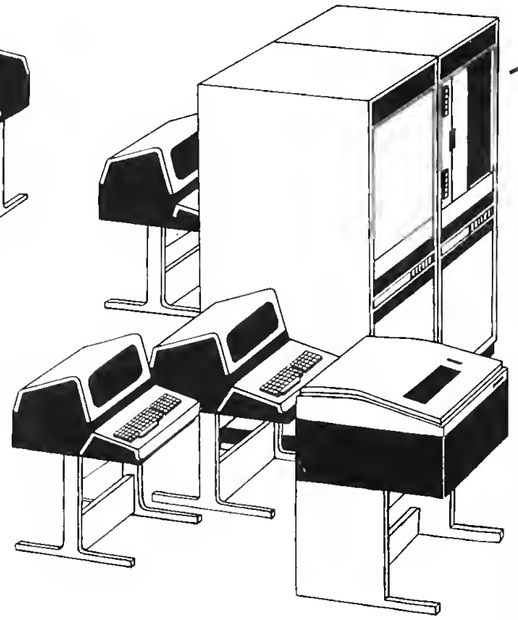
Measurement and Control Satellite

- Satellite Initiated Communications
- Central Program Scheduling
- Synchronous or Asynchronous Data Transfer
- Automatic Retransmission on Parity Errors
- 1,000 Kbps at 600' Hardwired



Production Information Satellite

- Use of Central Peripherals
- Program Development at Central
- Program Storage at Central
- Program Test-Execution on Central
- RJE to Central
- RJE to IBM

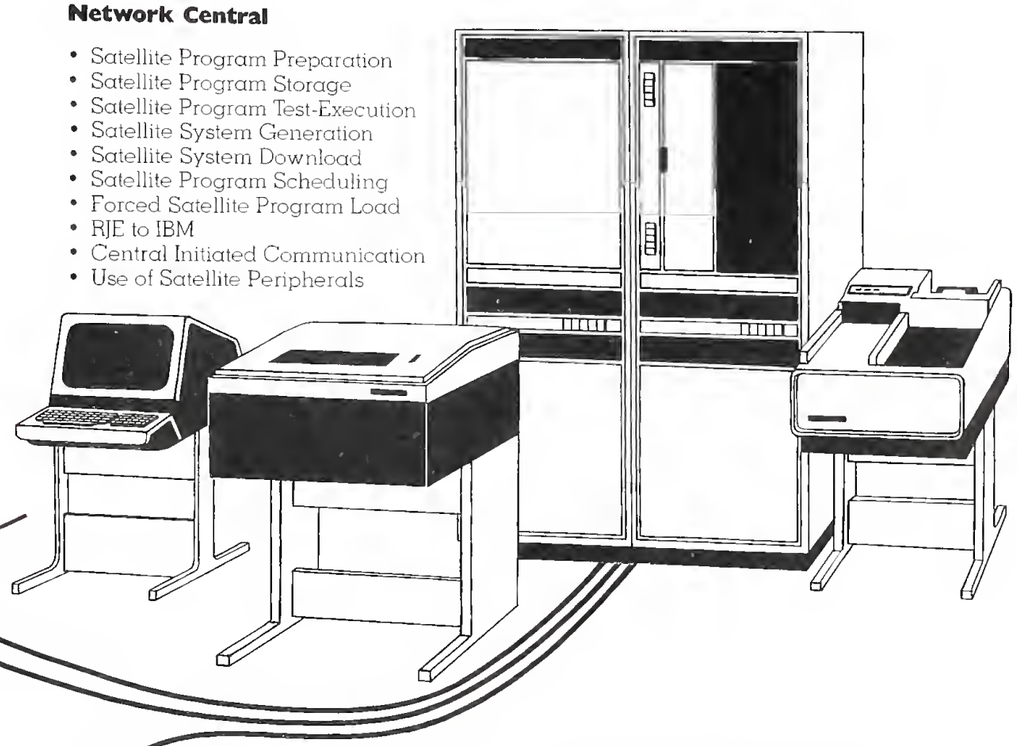


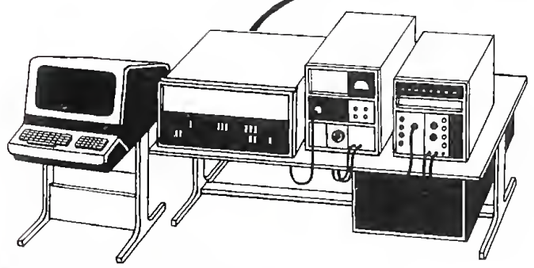
Data Entry Satellite

- Global Program to Program Communication
- Up to 19.2 Kbps via Synchronous or Asynchronous Modems
- Line Diagnostics for Line Status

Network Central

- Satellite Program Preparation
- Satellite Program Storage
- Satellite Program Test-Execution
- Satellite System Generation
- Satellite System Download
- Satellite Program Scheduling
- Forced Satellite Program Load
- RJE to IBM
- Central Initiated Communication
- Use of Satellite Peripherals





Lab Computation Satellite

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- System Download from Central
- Use of Central Peripherals
- Program Development at Central
- Forced Satellite Program Load
- Hardwired to 10,000'
- Remote File Access

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Three Phoenix Head Hits U.S. Policy on DP Exports

PHOENIX Arbitrary trade restrictions imposed by the U.S. government on manufacturers of computers and related products have added to this country's economic woes, according to Donald E. Oglesby, president of Three Phoenix Co.

"I don't think our own [congressional] representatives are aware of the problems. They are not aware of the magnitude of the business lost by U.S. companies," Oglesby said.

Three Phoenix manufactures computer disk testers and tape drives for minicomputers.

"If we had freer trade, we could change the employment picture of the country drastically," Oglesby stated.

U.S. companies lose many sales each year to Western European firms that sell to their Eastern Bloc neighbors. U.S. companies cannot compete favorably in the international market, he said, because the U.S. government fears too much technology will go along with the sales.

There's never been a doubt Western countries limit the flow of technology from West to East in the computer field, especially if products have military applications, he said.

But the efforts of the West haven't slowed Soviet research and development, he added, because the East has developed computer systems that approach the sophistication of mid-level U.S. products.

Oglesby also maintained U.S. companies are losing valuable sales to both East and West Europe because the U.S. government won't permit sales of obsolete equipment, which in some cases have been blocked for several years even though there are no buyers in the U.S.

Penisten Quits Datran Presidency; Wyly Elected to Take Over Post

Glenn E. Penisten has resigned his post as president and chief executive officer of Data Transmission Co. (Datran) but will continue an association with the firm as vice-chairman of the board of directors. Concurrently, Sam Wyly, chairman of both Datran's board of directors and its parent company, Wyly Corp., has been elected to assume Penisten's position as president and chief executive officer.

Other Moves

- B. Allen Lay has been named senior vice-president and general manager of the CMC Group.
- Three persons have been appointed division vice-presidents at Pertec Business Systems. Dr. John E. Belt has been named engineering division vice-president. Paul A. Busse was also named a vice-president; and Donald F. Orr, formerly president of CMC International has been named vice-president of marketing.
- Donald B. Bonstrom has been named vice-president of research and advanced design at Control Data Corp.
- James E. Williams has been appointed vice-president of finance for the Field Engineering Division of Itel Corp.
- Takeo Shiina has been elected to the board of directors of IBM World Trade Americas/Far East Corp. Shiina is president of IBM Japan Ltd. and a member of its board of directors.
- Steven R. Gerbsman has been appointed vice-president of the Computer Products Division for Itel Corp.'s Data Products Group.

Executive Corner

- John W. Schneider resigned from his position as vice-president of marketing at Interdata Corp. He will serve in a corporate staff position temporarily and James Bruno, executive vice-president, will handle marketing functions until a successor is named, an Interdata spokesman said. In addition, Interdata has named Joseph Rechner vice-president of customer service.
- Lee N. Rubin has been appointed vice-president of operations at Diva, Inc.
- Edward C. Becker Jr. has been appointed vice-president of data centers for Greyhound Computer Corp.

Earnings Reports

WALLACE BUSINESS FORMS
Three Months Ended Jan. 31

	1976	1975
Shr Ernd	$.68	$.68
Revenue	19,813,000	18,852,000
Earnings	1,339,000	1,273,000
6 Mo Shr	1.25	1.20
Revenue	37,571,000	34,149,000
Earnings	2,455,000	2,234,000

TRILOG ASSOCIATES
Three Months Ended Jan. 24

	1976	1975
aShr Ernd	.....	$.02
Revenue	$525,574	471,658
Tax Item	(3,649)	12,948
Earnings	(16,163)	25,791
a6 Mo Shr	.....	.06
Revenue	1,060,956	971,752
Tax Cred	.....	29,486
Earnings	(878)	72,782

a-Restated to reflect nine-for-one stock distribution of Oct. 3, 1975.

TELECREDIT
Three Months Ended Jan. 31

	1976	1975
Shr Ernd	$.19	.....
Revenue	3,084,188	$1,932,053
Spec Item	a110,000	(55,000)
Earnings	224,269	(110,700)
9 Mo Shr	.59	.09
Revenue	8,463,654	6,094,215
Tax Cred	329,000	46,500
Earnings	670,100	96,350

a-Tax-loss carryforward.

APPLIED MAGNETICS
Three Months Ended March 31

	1976	1975
Shr Ernd	$.07	$.04
Revenue	15,572,000	16,306,000
Earnings	302,000	170,000
6 Mo Shr	.10	.06
Revenue	29,575,000	31,943,000
Earnings	421,000	262,000

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WE're looking for an individual with a thorough knowledge of the peripheral market, including existing Digital peripherals and plans for future peripheral products.

You'll be extensively interfacing with vendors and should have a working knowledge of inventory control. You'll be involved with in-house management, working with marketing strategy, developing sales guides and should be capable of initiating and implementing creative marketing programs.

You should be able to determine peripheral needs, and coordinate with production and inventory control in the promotion, selling and shipping.

You'll need at least 5-6 years experience within the industry.

Complex Systems Market Consultant

This is a highly technical software as well as hardware marketing oriented position. You will be required to participate in developing and evaluating new products in both areas. Responsibilities involve interfacing with sales people and customers in order to determine hardware/software needs, then communicate these needs to hardware engineers and software designers so that a product may be designed to meet the customers requirements.

You must have DECsystem-10 experience and be familiar with DECsystem-10 software and hardware. This position requires 30-50% travel.

Special Terminals and Communications Product Manager

You'll be involved with the development of remote line concentrators, special terminal offerings and IBM interfaces.

You should have in-depth knowledge of data communications, computer networks, remote concentrators, Digital and IBM protocols, as well as state-of-the-art information on terminals and remote concentrators.

Software Engineers

Get involved with Digital's Galaxy Program

Digital's Marlboro facility is heavily involved in a major, sophisticated program.

Galaxy the ultra-new, highly advanced *Batch* system designed to interface with Digital's DECsystem-10/20.

This high visibility position offers an unparalleled opportunity for the creative and responsible engineer. You'll develop enhancements in a large scale, state-of-the-art, sub system for our DECsystem-10/20.

To qualify, you must have 2-3 years with assembly language programming. Basic experience with a large scale multi programming operating system, preferably the DECsystem-10 desirable, but not mandatory. A BS in Computer Science or equivalent preferred.

With our Galaxy program, you'll design, develop and maintain a new *Batch* processing sub system.

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For an appointment, please direct your resume to Julia Michaelson, Digital Equipment Corporation, 200 Forest Street, Marlboro, Massachusetts 01752.

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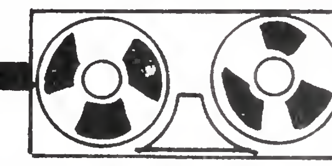

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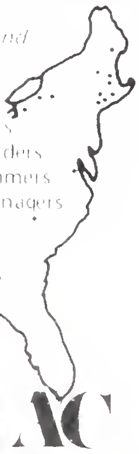

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Reports to Executive Vice President and responsible for IBM 371-15 computer center and related equipment, operating under DOS/VS/POWER. Requires development, analysis, and design of broad educational administrative applications, and coordination with academic departments. Qualifications: bachelor's degree, knowledge of on-line applications, and high level languages. Salary range: $20,000-$22,500 plus liberal fringe benefits. Resume and salary history to: Personnel Director, Saint Peter's College, 2641 Kennedy Boulevard, Jersey City, N.J. 07306. *St. Peter's is an Affirmative Action-EEO Employer.*

EMI

ENGINEERS & PROGRAMMERS

Excitement, professional fulfillment, contribution to humanity, technical challenge, and both psychological as well as material rewards are all terms that characterize the positions currently available with EMI Medical, Inc.

The Company:

Affiliated with its parent company, EMI, Ltd., a long established and eminently successful organization based in the United Kingdom, EMI Medical, Inc., is the acknowledged leader in the field of Computer Assisted Tomographic Scanning Systems. Through concurrent research and development in the U.K. and the U.S.A. systems have been developed for both diagnostic and therapeutic medical application. Refinements and new system development continue at a rapid pace. Hundreds of systems are now installed in the U.S.A. with proven and dramatically effective performance.

The Positions:

Rarely is there available such a range of opportunities in fully professional, high technology positions. Incredible growth is realistically projected coupled with immediate challenge on a foundation of already well established product performance and financial success. Consider these positions in relation to your professional background and career interests.

Computer Hardware Engineers

Involves in-depth digital engineering, processor specifications, interface design, peripheral selection, microprocessors, impact forecasting, reliability and systems debugging. Requires Masters Degree in Electronics Engineering or Computer Science with 3-5 years computer hardware design experience.

Display Systems Engineers

Requires well rounded experience in and design knowledge of digital processing and display technology, video circuit design, CRT color TV, digital graphics, including non-CRT display techniques, digital/analog conversions, and electro-optical physics. Requires Masters Degree or equivalent in Electronics Engineering or Physics.

Electronic Design Engineers

Involves a mix of design knowledge of digital electronics including logic circuit design, pulse circuits, low noise amplifiers, high voltage power supplies, and memory systems. Requires Masters Degree or equivalent in Electronics Engineering.

Computer Software Engineers

Requires in-depth experience of 3-5 years in computer operating systems, compilers, image processing, real-time systems, data management, systems diagnostics, and a range of scientific programming languages. Requires Masters Degree or equivalent in Computer Science.

Management Information Systems Analysts

Involves design of on-line business systems. Knowledge of inventory control systems, financial systems and manufacturing systems is necessary. Masters Degree or equivalent in Business Administration, Computer Science or Industrial Engineering is required.

Management Information Systems Programmers

Will be involved in implementing various on-line business systems. Must have experience in real-time applications, data base systems communications network. Bachelor of Science Degree or equivalent is required.

A mix of positions from support engineers to group managers within these disciplines are available. Beyond the implicit challenge, a compensation package of outstanding design is offered plus an exceptional benefits program and regular progress review. All positions are located in Northbrook, Illinois, an attractive Northern suburb of Chicago.

For confidential consideration of mutual interests and prompt response, please send a complete resume and salary history to Personnel Department.

EMI MEDICAL INC
3605 Woodhead Drive Northbrook, Illinois 60062.
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SOFTWARE PROFESSIONALS NYC INTERVIEWS

Representatives of Digital Equipment Corporation will be interviewing in NYC. For additional information, please see our advertisement on page 76 in the Mini-world section of Computerworld.

If unable to meet with us in NYC, please forward your resume to Mr. Justin Kelleher or Mr. Art McMahon, Digital Equipment Corporation, 162 Main Street, Maynard, Mass. 01754.

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SYSTEMS ANALYST

(Human Resource System)

R.J. Reynolds Industries, Inc. has an opening within its Corporate Systems Department in the area of personnel/payroll related systems. Corporate Systems is presently forming a project team to develop and implement a highly sophisticated, corporate-wide, human resource information system.

Applicants should possess the following:

- Undergraduate degree, MBA preferred.
- Background in systems analysis with personnel/payroll or related systems.
- Working knowledge of COBOL desirable.
- Good communication and analytical skills.
- Capability of functioning as a "team member".
- Ability to interface with all levels of management.

Winston-Salem, North Carolina, location.
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Mr. Denis G. Simon
Corporate Employment Department
R.J. Reynolds Industries, Inc.
Winston-Salem, North Carolina 27102

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East: Boston (617/237-3120), New York-New Jersey (201/687-8700), Philadelphia (215/665-1717), Washington, D.C. (703/790-5610).
Midwest: Chicago (312) 782-0857), Cleveland (216/771-2070), Detroit (313/352-6520), Kansas City (816/474-3393), Minneapolis (612/544-3600), St. Louis (314/862-3800).
South & Southwest: Atlanta (404/634-5127), Dallas (214/638-4080), Fort Worth (817/338-9300), Houston (713/626-8705), New Orleans (504/523-2576).
West Coast: Los Angeles (213/386-5500), Irvine, CA. (714/833-1730), Palo Alto (415/328-7155), San Francisco (415/434-2410).

EDP Professionals

The Jarvis Walker Groups, specialists in Data Processing recruiting, represent large & small client companies. . . in all areas of industry. . .across the nation. At the present time, we are faced with an unprecedented demand from our clients for Information Systems Professionals.

Client needs exist at the Programmer level. . .up through Project Manager positions. Salaries range from $12,000 to $40,000.

If you feel that your present position does not afford you the necessary career growth; please call or send letter/resume describing your experience, career goals, salary requirements, location desired, etc. . .to the appropriate office. . .and one of our associates will be happy to discuss specific client situations with you.

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NEW YORK CITY: Two Penn Plaza, NYC 10001 (212) 239-0600

NEW JERSEY: 349 East Northfield Road Livingston, NJ 07039 (201) 994-3773

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DATA BASE DESIGN

Boeing Computer Services, Inc. in Seattle, WA, a subsidiary of The Boeing Company, is seeking experienced systems analysts with extensive background in Data Base Management System Design. These positions involve the design and implementation of the data base for a scientific application operating in a time sharing environment on both IBM and CDC large scale equipment.

Candidates must have at least 5 years of experience in the development and performance analysis of large scale data base oriented applications systems involving a wide variety of data structures. Experience with CDC KRONOS or IBM CP-CMS is desirable. An educational background in computer science or engineering preferred. U.S. citizenship is required.

If you qualify, send your résumé to The Boeing Company, P.O. Box 3707-TBH, Seattle, WA 98124.

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111 Pearl St.
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Data Processing Professionals

A Southeastern financial institution is seeking highly qualified individuals to assist in the implementation of Data Base/Data Communications Systems.

Manager of Systems Development

Individual must have 7-8 years experience in Data Processing with emphasis on managing large projects. Will be fully responsible for professional staff of 25-30. IMS and banking experience helpful.

Project Managers

Responsible for a design team implementing customer INFO FILE, 3600 Teller Terminals, and new software development. Extensive experience in systems design, utilizing IMS, is desired.

Senior Systems Analyst

Requires 4-5 years experience in either Commercial Loan, Consumer Lending, or Savings & Loan. Must be capable of interfacing with senior management in the design and implementation of banking applications.

Programmers & Programmer Analyst

Requires senior-level experience in developing application software packages for the banking environment. Individuals must have 3-5 years experience in ANS COBOL with IMS background.

These positions offer challenge and opportunity plus an attractive salary and benefits package.
Forward a resume, complete with salary history, in strict confidence to:

CW Box 4667
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Data Processing Opportunities

Cutler-Williams, Inc. has immediate openings, on a permanent or part time basis, in several U.S. Cities, LA, SF, Dallas, Detroit, Houston, Chicago, Miami, Washington, D.C., and several more.

PROGRAMMERS

Minimum of 1-2 years experience to include COBOL and/or BAL or 360/370 or comparable computers. Program design, flow charting, documentation, testing and implementation, programs or systems specification conversion.

PROGRAMMERS/ANALS.

Minimum of 2-3 years experience to include heavy COBOL and/or BAL, a good command of J.C.L. systems analysis and user interface. . .the ability to plan, schedule, coordinate and lead development of major business systems with project responsibility. I.M.S. and/or C.I.C.S. highly desirable.

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CW PROGRAMMING

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Jerry Beatty, Corporate Personnel Director

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(BSEE or Comp. Sci.)

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- minimum of 2 years on the job experience
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- "hands-on" experience with multiprogramming operating systems
- working knowledge of async/bisync comm methods
- ability to assist in the design and implementation of specialized device controllers
- able to design and implement device drivers
- assist in the design and implement of microprocessor peripheral control units
- ability to generate clear and concise documentation

SALARY RANGE: 14-18K per annum, commensurate with experience.

Interested applicants should submit a detailed summary of previous duties and accomplishments to:

CHICAGO MEDICAL COMPUTERS, INC.
2800 West 95th St., Evergreen Park, IL 60642
Attn: Professional Employment Mgr.

Selected applicants will be contacted to arrange a personal interview.

USER SERVICES MANAGER

The Central Computing Facility (CCF) of the University of Alabama in Birmingham invites applications for the position of User Services Manager. The CCF operates a 3MB IBM 370/158 OS/VS2/TSO, CICS and IMS.

Candidates must be able to interact with and respond to faculty, staff and student computing needs. Responsibilities include user consulting, technical writing, maintenance of an on-line documentation system and user instruction. Major software includes TSO, WYLBUR, SPEAKEASY, ICES and a variety of mathematical and statistical packages.

Required qualifications are:
Extensive consulting experience in an OS/TSO environment, and experience with software evaluation and installation.
Preferred additional qualifications include:
1. Post-BS degree in related field.
2. Operating systems experience.
3. IBM Assembler experience.

Deadline for application receipt is June 20, 1976.
Apply to: Personnel Office, University of Alabama in Birmingham, University Station, Birmingham, Alabama 35294.
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Aggressive, innovative problem solvers to participate in developing and installing Life Insurance systems.

To qualify, you should have 2-5 years experience in ALC or COBOL using IBM 360/370. Working knowledge in OS, CICS or IMS is helpful and life insurance background is a definite plus.

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REQUIRED: Heavy data base, MIS background (IMS/DC experience) with an advanced degree in math or computer science. A minimum of 4 years relevant experience.
DESIRABLE: TSO/WYLBUR and prior supervisory experience.

PROGRAMMER/ANALYST

REQUIRED: Degree or equivalent, with experience in PL/1, FORTRAN and OS/JCL (for use in scientific/statistical and data base/IMS applications).
DESIRABLE: COBOL and on-line applications experience.

If you are ready for an important step in your career and want to be associated with goals worth your involvement, send a resume to Manager of Scientific Employment, Schering Research Center, 60 Orange St., Bloomfield, N.J. 07003.

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M.S. or PhD in Electrical Engineering or Computer Science and five years experience in hardware and software design of real-time computer systems.

Language Processor Designers
M.S. or PhD in Computer Science and three years experience in development of programming languages, compilers, translators, assemblers and link editors.

Software System Designer
M.S. in Computer Science or Engineering and five years experience in design of software systems for real-time and interactive systems.

Programmers
B.S. in Computer Science, Math, Physics, or Engineering and programming experience with higher order languages such as Fortran, Pascal or PL/1. Both scientific and real-time programmers are required.

Positions are also available for people to develop system software and to analyze the design of Texas Instruments' super-computer, the Advanced Scientific Computer.
Openings for these positions are in Dallas, Texas, Austin, Texas, and several other cities in the U.S., such as Huntsville, Ala., Princeton, N.J., Ridgecrest, Calif., and Washington, D.C.
U.S. Citizenship Required.

Send your resume in confidence to
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These positions entail systems design and development of software for large custom communications systems. A minimum of 2 years of directly related experience in the development of communications software and strong minicomputer background is required. A related BS degree is preferred.

Submit resume including salary history and requirement to Bruce Bertsch, Manager, Industrial Relations.

NCR Special Systems Division

4045 Sorrento Valley Blvd.
San Diego, Calif. 92121

SYSTEMS PROGRAMMER

370/145 installation requiring OS/VS1 needs experienced individual to support OS/VS software. Background in IMS, RES or data communication is an advantage.

Position reports to Technical Support Manager of multidivisional manufacturing firm headquartered in Northern Illinois.

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To qualify you should have

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- 2-7 years' experience in systems design, in addition to experience in programming of large business systems using COBOL and modern data base management techniques.
- Excellent oral and written communications skills.
- Knowledge of large computer operating systems. On-line systems experience a plus.

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You will assist the Program Manager in the analysis and design of information systems and perform program module specifications, programming, coding, testing and documentation from system specifications. Your competency should span systems analysis for hardware, software and applications. Note: All these assignments involve customer contact and some foreign travel. One position is based in Washington, D.C. Qualified candidates will have a Bachelors degree or the equivalent and at least two years of COBOL and data base experience preferably on Honeywell 6000 systems.

Software Programmer (H6000)

You will assist Programmer Analysts in the preparation of program module specifications. Competency in programming languages and data access methods is required, together with a Bachelors degree and at least one years experience with the Honeywell operating system.

Senior Systems Analysis Consultants

[illegible]

Information Systems Programmers

You will assist programmer analysts in the [illegible] program module specifications and [illegible] test modules. A Bachelors degree [illegible] with at least [illegible] years related experience [illegible] essential and IBM [illegible] will be helpful.

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Qualified candidate [illegible] degree [illegible] ence or Engineering with ten years experience [illegible] large scale computer programs [illegible] data banks. This experience must be [illegible] and include managerial responsibilities.

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The Mid-Illinois Computer Cooperative (MICC) a computer network providing timesharing and remote batch academic computing services to five state universities, seeks applications for the position of Executive Director. MICC operates a Control Data Cyber 72 computer system under KRONOS operating system on the campus of Southern Illinois University at Edwardsville. Other members of MICC include Eastern Illinois University, Illinois State University, Sangamon State University and Western Illinois University.

The Executive Director is the chief operating officer of MICC and reports to the MICC Operating Board. Minimum qualifications for the position include a Ph.D. degree and five years of progressively responsible experience in the management of an academic computing facility or an equivalent combination of education and experience. Salary range if $24,000 to $28,000 annually. Deadline for receipt of applications is June 21, 1976. Applications should be sent to:

Dr. Warren Harden
Chairman, MICC Operating Board
Office of Institutional Research
and Computer Operations
Illinois State University
Normal, IL 61761

S R A

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Zero in on one of these career opportunities today and receive the challenge, growth and monetary rewards you deserve. For more information about these and other opportunities send your resume and salary history to: Dennis R. Simon, EDP Division Mrg., Sanford Rose Associates, Suite 607, 150 East Broad St., Columbus, Ohio 43215. Phone: (614) 224-0081

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If you have a proven record of success in marketing DP hardware and/or services against top competition and are interested in employment with a rapidly growing, dynamic, nationwide company, BCS is interested in you. Please send a résumé c/o The Boeing Company, P.O. Box 3707-TBI, Seattle, WA 98124.

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You will be responsible for developing and maintaining new accounts. Knowledge of hardware/software architectural concepts, computer languages, and "front end" hardware required. An in-depth knowledge of a specific market such as Lab Data Acquisition, Data Communications, OEM, Large Scale Systems, Terminal/Peripheral markets and Industrial Process Control is necessary. B.S. in Computer Science preferred. We have additional openings on the senior level for representatives who can supervise in a team environment.

Resident Software Support Specialist

As one of a highly skilled specialist group, you will provide customer support to our clients on a resident basis. For an 8 to 12 month period, your responsibilities will include on-site software development, customer education, and set-up assistance. Background should include 2-3 years of total computer experience in one or more of these areas: system programming, real time applications, time sharing or process control applications. We are also seeking support specialists for our large DEC system 10.

Software Support Specialists

A degree in either Computer Science, Math or Business Administration with a concentration on computer software is helpful; equivalent experience considered. Knowledge of two of the following languages required: Cobol, Assembly, RPG, Fortran, or Basic. Broad background in computer systems and marketing applications is necessary, in addition to the ability to write and deliver presentations to clients. Senior positions require three languages and ability to develop proposals and analyses to support an account marketing effort.

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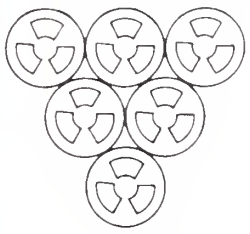

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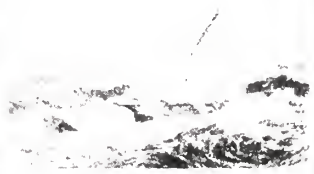

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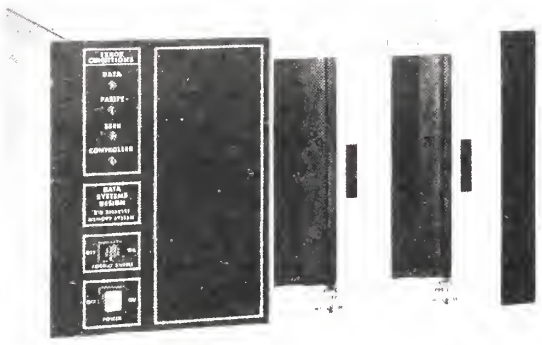

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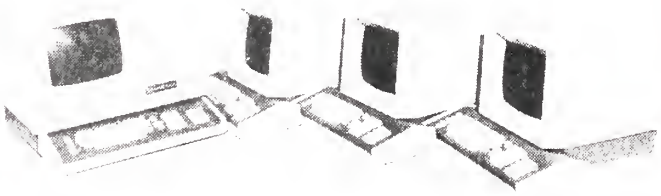

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SAN ANTONIO, Texas – Datapoint Corp. reported improved earnings and revenues in the third quarter and nine months ended April 30.

Prior to tax credits, earnings in the three months rose 59% and in the nine months 47%.

For the third quarter, Datapoint earned nearly $1.7 million or 54 cents a share compared with $1.1 million or 50 cents a share in the year-ago period, when there was a $336,000 tax credit.

Revenues rose to $19.5 million in the three months compared with $12.3 million in the same period last year.

Nine-month earnings rose to almost $4.6 million or $1.61 a share compared with $3.1 million or $1.48 a share in the same year-ago period.

Tax credits during the nine months were $495,000 in the 1976 period and $975,000 in the 1975 period.

Revenues during the nine months rose 52% to $50.6 million compared with $33.2 million in the same period last year.

The purchase value of equipment shipped for sale or lease during the nine months rose 56% to $102.6 million compared with $65.7 million a year earlier.

MAI Posts Record for Second Quarter

NEW YORK – Management Assistance, Inc. (MAI) scored record revenues and earnings for the second quarter ended March 31.

The company anticipates a continuation of its record performance for the remainder of the year, according to Raymond P. Kurshan, MAI chairman.

Bolstered by sales of Basic/Four systems, revenues grew to $28.7 million compared with $21.9 million in the year-ago quarter. Sales of Basic/Fours accounted for $13.7 million and $9.1 million respectively.

Although sales of Basic/Four systems were up 51% compared with the year-ago period, they were down 4% from the preceding first quarter.

This drop was caused by revenues recorded in the first quarter from a single sale of 11 systems and to delays in deliveries by suppliers, thus deferring certain system installations and billings to the third quarter, the firm said.

During the quarter the firm earned $3.1 million or 10 cents a share including a $1 million tax credit compared with $383,000 or 1 cent a share in the year-ago period, when the tax credit of $209,000 failed to offset a $592,000 write-off of a settlement agreement receivable from Potter Instrument, Inc.

A change in accounting for translation of foreign currencies reduced the year-ago quarter's income by $181,000 while increasing the 1975 half-year earnings by $269,000, the firm said.

For the six months, revenues rose to $57.1 million compared with $44.8 million.

Half-year earnings totaled $6 million or 20 cents a share, including a $2.6 million special credit, compared with $2.4 million or 8 cents a share when the special items netted out to $110,000.

Data Disc Suffers Loss in Quarter

SUNNYVALE, Calif. – Consistent with its operating plan, Data Disc, Inc. reported a loss of $328,000 or 30 cents a share for the first quarter ended April 2.

The firm had forecast such a loss previously and said it is continuing to invest resources in the engineering and manufacturing areas, as well as other operating areas, which will produce new products, improved services and lower manufacturing costs in the latter part of the year.

Revenues dropped slightly to $1.65 million from $1.69 million in the same period last year, when the loss was $96,000 or 9 cents a share.

The combined backlog of Data Disc and subsidiaries as of April 2 was $2.8 million compared with $2 million at the end of the year-ago quarter.

GA Anticipating Third-Quarter Loss

ANAHEIM, Calif. – General Automation, Inc.'s (GA) third-quarter revenues may well be down to about $14 million, resulting in a loss for the quarter, Chairman Lawrence A. Goshorn said.

However, GA still expects to achieve its "turnaround year" goal of profitability, he added.

The expected decline in revenues stems from a slippage in shipments into the fourth quarter, when shipments are expected to set a record.

"Results for the third quarter should not be construed as a trend," Goshorn said. "The decline in revenues is a direct result of some fundamental operational changes that had to be made to keep the commitment to our shareholders to improved margins and profits and a strengthened balance sheet."

New Registrations

INFORMATION MAGNETICS CORP., 5740 Thornwood Drive, Chicago, Ill. 60648, manufacturer of magnetic disk and tape recording heads and linear motors, filed to register 816,021 shares of common, of which 550,000 are to be offered on behalf of the company and 266,021 on behalf of selling stockholders. Underwriters are C.E. Unterberg, Towbin & Co., 61 Broadway, New York, N.Y. 10006 and Hambrecht and Quist, 235 Montgomery St., San Francisco, Calif. 94104.

CONTROL DATA CORP., 8100 34th Ave., S. Bloomington, Minn. 55420, a computer firm, filed to register 67,675 shares of common. No underwriter is involved.

COMPUTER AUTOMATION, INC., 18651 Von Karman Ave., Irvine, Calif. 92713, a minicomputer manufacturer, filed to register 40,834 shares of common, which may be offered for sale from time to time by certain stockholders at prices current at the time of sale. No underwriters are involved.

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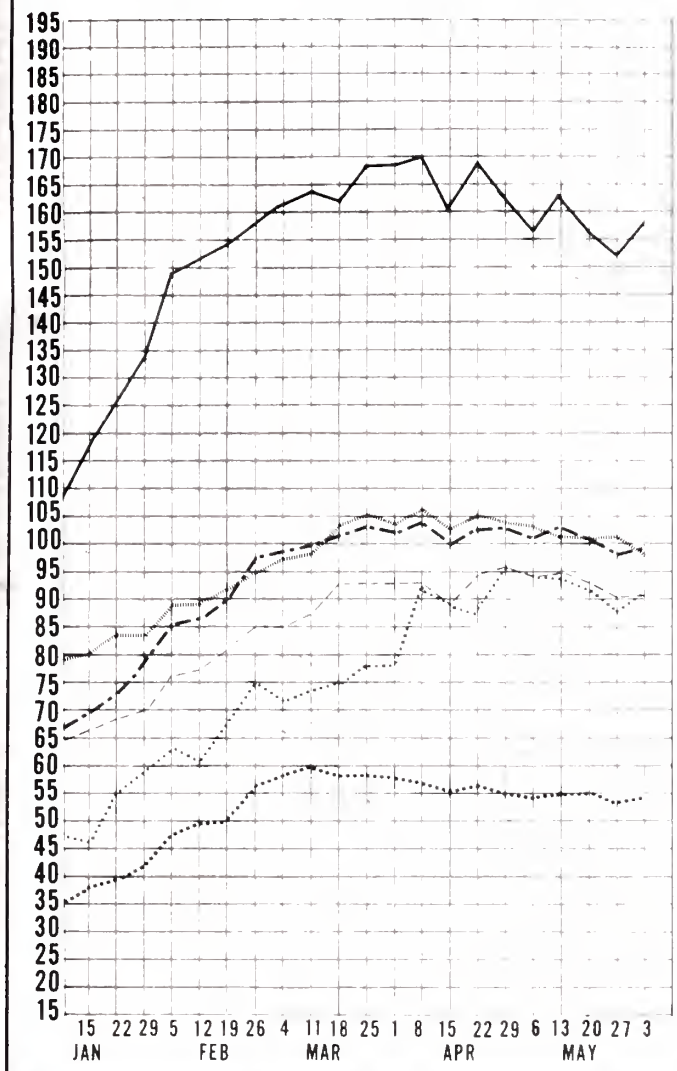
References from corporations, service bureaus, vendors and customers are available upon request.

COMPUTERWORLD Computer Stocks Trading Indexes



Earnings Reports

AUTOMATIC DATA PROCESSING
Three Months Ended March 31

	1976	a1975
Shr Ernd	$.64	$.48
Revenue	49,246,000	39,716,000
Earnings	4,600,000	3,371,000
9 Mo Shr	1.73	1.39
Revenue	135,563,000	112,542,000
Earnings	12,514,000	9,705,000

a-Restated for pooling-of-interests acquisition.

TELECOR
Three Months Ended Feb. 29

	1976	1975
Shr Ernd	$.20	$.06
Revenue	15,742,264	11,487,475
Earnings	554,082	163,153
9 Mo Shr	.84	.69
Revenue	57,585,860	49,645,343
Earnings	2,329,843	1,921,614

CENTRONICS DATA COMPUTER
Three Months Ended March 31

	1976	1975
Shr Ernd	$.61	$.41
Revenue	13,503,054	10,704,217
Earnings	2,954,991	1,959,486
9 Mo Shr	1.61	1.17
Revenue	37,906,998	30,969,745
Earnings	7,753,581	5,587,746

DOCUTEL
Three Months Ended March 31

	1976	1975
Shr Ernd	$.24	$.02
Revenue	8,247,000	5,812,000
Tax Cred	313,000	29,000
Earnings	614,000	63,000

ENNIS BUSINSS FORMS
Year Ended Feb. 29

	1976	1975
Shr Ernd	$1.22	$1.54
Revenue	55,262,305	58,919,288
Earnings	2,800,626	3,579,862
3 Mo Shr	.39	.25
Revenue	13,686,534	14,037,924
Earnings	897,809	565,503

GRAHAM MAGNETICS
Three Months Ended March 31

	1976	1975
Shr Ernd	$.16	$.18
Revenue	3,939,402	3,635,095
Earnings	150,001	167,811
9 Mo Shr	.80	.88
Revenue	12,114,012	11,883,388
Earnings	750,564	830,793

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TRADE★QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 2, 1976

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1976 RANGE (1)	CLOSE JUNE 2 1976	WEEK NET CHANGE	WEEK PCT CHANGE
N	BURROUGHS CORP	64-108	97	+1 3/8	+1.4
O	COMPUTER AUTOMATICS	10- 19	14 3/4	- 1/4	-1.6
N	CONTROL DATA CORP	18- 27	21 1/8	+ 1/2	+2.4
N	DATA GENERAL CORP	40- 60	49 1/2	- 7/8	-1.7
O	DATAPOINT CORP	24- 45	37 1/2	-1 1/4	-3.2
O	DIGITAL COMP CONTROL	2- 4	2 5/8	- 1/8	-3.3
N	DIGITAL EQUIPMENT	138-181	163 1/2	+3 1/2	+2.1
N	ELECTRONIC ASSOC.	2- 5	3 1/8	+ 1/8	+4.1
A	ELECTRONIC ENGINEER.	7- 16	15 3/8	+1 3/8	+9.8
N	FOXBORO	28- 42	42 3/8	+1 3/4	+4.3
O	GENERAL AUTOMATION	5- 11	7 3/4	+ 1/4	+3.3
C	GRI COMPUTER CORP	1- 1	5/8	+ 1/8	+25.0
N	HEWLETT-PACKARD CO	95-117	108	+5 1/2	+5.3
N	HONEYWELL INC	34- 56	43 3/8	+ 1/4	+0.5
N	IBM	277-272	287 1/2	+7 1/2	+3.0
O	MANAGEMENT ASSIST	1- 3	2 1/8	+ 1/8	+6.2
C	MEMOREX	18- 33	28	+ 1/2	+1.8
O	MICRODATA CORP	10- 26	18 5/8	+ 3/4	+4.1
O	MODULAR COMPUTER SYS	9- 13	11 1/2	+ 3/4	+6.9
N	NCR	24- 31	28 3/8	+ 3/8	+1.3
O	PRIME COMPUTER INC	4- 11	9 1/4	0	0.0
N	PERKIN-ELMER	19- 27	21 7/8	- 3/8	-1.6
N	RAYTHEON CO	45- 55	55	+1 3/4	+3.2
N	SPERRY RAND	40- 50	47	+ 1/4	+0.5
O	SYCOR INC	20- 31	24 1/2	- 1/4	-1.0
A	SYSTEMS ENG. LABS	6- 10	8	- 1/4	-3.0
N	VARIAN ASSOCIATES	13- 17	14 1/4	+ 5/8	+4.5
A	WANG LABS.	11- 20	11 3/4	+ 1/2	+4.4

LEASING COMPANIES

EXCH		1976 RANGE (1)	CLOSE JUNE 2 1976	WEEK NET CHANGE	WEEK PCT CHANGE
O	COMDISCO INC	3- 10	5 3/4	- 3/4	-11.5
A	COMMERCE GROUP CORP	2- 3	2 3/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	1 3/4	0	0.0
M	DATRONIC RENTAL	1- 1	1 1/8	+ 3/8	+50.0
A	DCL INC	1- 1	3/4	+	+9.0
N	DPF INC	5- 7	5 5/8	0	0.0
A	GREYHOUND COMPUTER	3- 8	7 1/8	- 1/8	-1.7
N	ITEL	6- 13	11 1/2	+ 1/4	+2.2
N	LEASCO CORP	6- 14	11 3/4	+ 5/8	+5.6
O	LEASPAC CORP	0- 1	1/4	0	0.0
O	NRG INC	1- 1	1/2	0	0.0
A	PIONEER TEX CORP	6- 9	7 5/8	- 1/2	-6.1
N	U.S. LEASING	7- 12	9 1/4	- 1/8	-1.3

SOFTWARE & EDP SERVICES

EXCH		1976 RANGE (1)	CLOSE JUNE 2 1976	WEEK NET CHANGE	WEEK PCT CHANGE
O	ADVANCED COMP TECH	1- 2	1 1/4	0	0.0
A	APPLIED DATA RES.	2- 3	2 3/4	0	0.0
N	AUTOMATIC DATA PROC.	54- 67	67 1/8	+2 1/4	+3.4
O	COLEMAN AMERICAN COS	4- 6	3 1/2	0	0.0
C	COMPUTER DIMENSIONS	3- 7	5 1/8	- 1/4	-4.6
C	COMP ELECTION SYSTMS	5- 9	7 3/4	- 1/4	-3.1
C	COMPUTER HORIZONS	1- 2	3/4	- 1/4	-25.0
C	COMPUTER NETWORK	2- 6	4 1/4	+ 1/8	+3.0
N	COMPUTER SCIENCES	4- 8	6 1/4	0	0.0
O	COMPUTER TASK GROUP	1- 1	1 3/8	0	0.0
C	COMPUTER USAGE	2- 6	3 1/4	- 3/8	-10.3
C	COMSHARE	2- 8	7 1/2	+1 3/4	+30.4
O	DATATAB	1- 1	1	0	0.0
N	ELECTRONIC DATA SYS.	12- 16	12 1/4	- 1/4	-2.0
O	INTERNATIONAL INC	1- 1	1/8	0	0.0
C	IPS COMPUTER MARKET.	1- 2	1	0	0.0
C	KEANE ASSOCIATES	2- 4	3	0	0.0
C	KEYDATA CORP	3- 5	2 5/8	0	0.0
C	LOGICON	4- 4	3 3/4	0	0.0
A	MANAGEMENT DATA	1- 3	2 1/4	+ 1/8	+5.8
A	NATIONAL CSS INC	13- 25	15 3/4	- 1/8	-0.6
A	ON-LINE SYSTEMS INC	18- 22	19 1/4	+ 1/8	+0.6
N	PLANNING RESEARCH	3- 5	3 3/8	0	0.0
C	PROGRAMMING & SYS	1- 1	1/2	0	0.0
O	RAPIDATA INC	3- 5	2 3/4	+ 1/8	+4.7
O	REYNOLDS & REYNOLD	13- 21	17	+ 1/4	+1.4
C	SCIENTIFIC COMPUTERS	1- 1	3/4	0	0.0
O	TYMSHARE INC	19- 28	25 7/8	0	0.0
A	UPS SYSTEMS	3- 5	4	+ 1/8	+3.2
N	WYLY CORP	3- 7	3	- 1/8	-4.0

PERIPHERALS & SUBSYSTEMS

EXCH		1976 RANGE (1)	CLOSE JUNE 2 1976	WEEK NET CHANGE	WEEK PCT CHANGE
N	ADDRESSOGRAPH-MULT	8- 13	8 7/8	0	0.0
O	ADVANCED MEMORY SYS	4- 10	7	- 1/2	-6.6
N	AMPEX CORP	5- 8	7 1/4	- 1/8	-1.6
O	ANDERSON JACOBSON	2- 4	3	0	0.0
O	BEEHIVE MEDICAL ELEC	3- 6	6 1/4	+ 1/8	+2.0
A	BOLT,BERANEK & NEW	7- 10	8 1/4	+ 1/8	+1.5
N	BUNKER-RAMO	5- 7	5 7/8	+ 1/4	+4.4
A	CALCOMP	4- 7	4 1/2	+ 1/4	+5.8
O	CAMBRIDGE MEMORIES	2- 6	3 1/4	+ 1/2	+18.1
N	CENTRONICS DATA COMP	20- 36	28 5/8	1	-3.3
C	CODEX CORP	22- 42	35 1/2	- 1/2	-1.3
O	COGNITRONICS	1- 1	7/8	0	0.0
O	COMPUTER COMMUN.	1- 5	3 5/8	0	0.0
C	COMPUTER CONSOLES	4- 7	6 1/2	+ 1/4	+4.0
A	COMPUTER EQUIPMENT	1- 3	2	+ 1/8	+6.6
O	COMPUTER TRANSCEIVER	1- 3	1 1/4	0	0.0
C	COMTEN	4- 9	6 7/8	0	0.0
N	CONRAC CORP	20- 25	21 3/8	+ 3/8	+1.7
O	DATA ACCESS SYSTEMS	1- 3	3 3/4	0	0.0
O	DATA 100	7- 13	10 3/8	+ 5/8	+6.4
A	DATA PRODUCTS CORP	5- 11	9 1/4	+ 5/8	+7.2
C	DATA TECHNOLOGY	1- 2	1 1/2	0	0.0
O	DATUM INC	1- 2	2	+ 1/4	+14.2
O	DECISION DATA COMPUT	1- 4	1 3/4	+ 1/4	+16.6
O	DELTA DATA SYSTEMS	1- 1	1/2	+ 1/8	+33.3
N	ELECTRONIC M.B.M	1- 3	2 1/2	+ 1/8	+5.2
O	FABRI-TEK	1- 1	3/4	- 1/8	-14.2
O	GENERAL COMPUTER SYS	1- 2	1	0	0.0
N	HAZELTINE CORP	4- 12	9 7/8	+ 1/8	+1.2
N	HARRIS CORP	34- 48	44 7/8	- 1/8	-0.9
A	INCOTERM CORP	9- 20	10 1/4	-1 3/8	-11.8
O	INFORMEX INC	3- 7	4 1/2	+ 1/8	+2.8
O	INFORMATION INTL INC	13- 18	14 1/2	- 3/8	-2.5
O	INTEL CORP	68-105	69	- 1/2	-0.7
A	LINDY ELECTRONICS	4- 7	4 5/8	- 1/8	-2.6
O	MCI DATA CORP	3- 7	5 5/8	- 1/8	-2.1
A	MILGO ELECTRONICS	15- 20	15 7/8	+1 3/4	+9.6
N	MOHAWK DATA SCI	3- 7	6	+ 1/4	+4.3
O	PENRIL CORP	1- 3	2 1/8	- 3/8	-15.0
A	PERTEC CORP	3- 8	5	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	7- 10	4 1/2	-1	-18.1
O	QUANTEL CORP	4- 5	4 1/8	0	0.0
O	RECOGNITION EQUIP	6- 11	8 7/8	- 1/4	-2.7
N	SANDERS ASSOCIATES	4- 11	5 1/4	+ 1/8	+1.3
O	SCAN DATA	2- 4	2 3/8	- 1/4	-9.5
O	STORAGE TECHNOLOGY	5- 13	11 3/4	+ 1/8	+1.0
O	T PAR INC	6- 10	6 1/8	- 1/8	-2.0
O	TALLY CORP.	4- 6	5	- 1/8	-2.4
O	TEC INC	3- 5	4	- 1/4	-5.8
N	TEKTRONIX INC	45- 63	55 5/8	+ 3/8	+0.6
N	TELEX	2- 5	4	+ 1/2	+14.2
O	WANGCO INC	11- 22	15 7/8	- 1/8	-0.6
O	WINTEK INC	2- 2	2	0	0.0

SUPPLIERS & MISCELLANEOUS

EXCH		1976 RANGE (1)	CLOSE JUNE 2 1976	WEEK NET CHANGE	WEEK PCT CHANGE
O	ADVANCED SYSTEMS INC	1- 4	2 1/2	- 1/2	-16.7
O	BALTIMORE BUS FORMS	4- 5	4	- 1/4	-5.8
A	BARRY WRIGHT	6- 10	9 1/8	+ 1/8	+1.5
O	CYBERNETICS INC	1- 1	3/4	0	0.0
A	DATA EQUIPMENT	33- 42	35 1/4	- 1/4	-0.7
O	DUPLEX PRODUCTS INC	17- 24	16 3/4	- 1/4	-1.4
N	ENNIS BUS. FORMS	6- 8	7	+ 1/8	+1.8
O	GRAHAM MAGNETICS	6- 13	8 3/4	-1 1/4	12.5
O	GRAPHIC CONTROLS	13- 15	14 1/2	0	0.0
N	3M COMPANY	55- 65	55	-1 1/2	-2.6
O	MOORE CORP LTD	43- 51	44	+1 1/4	+2.9
N	NASHUA CORP	11- 17	16	- 1/4	-1.5
O	STANDARD REGISTER	16- 19	16 1/2	0	0.0
O	TAB PRODUCTS CO	5- 8	7 1/2	0	0.0
N	UARCO	21- 25	20 3/4	- 1/4	-0.7
O	VANTER GRAPHICS CORP	5- 8	6 5/8	+ 1/8	+1.9
A	WABASH MAGNETICS	4- 8	6 1/8	0	0.0
N	WALLACE BUS FORMS	19- 25	21	- 1/2	-2.3

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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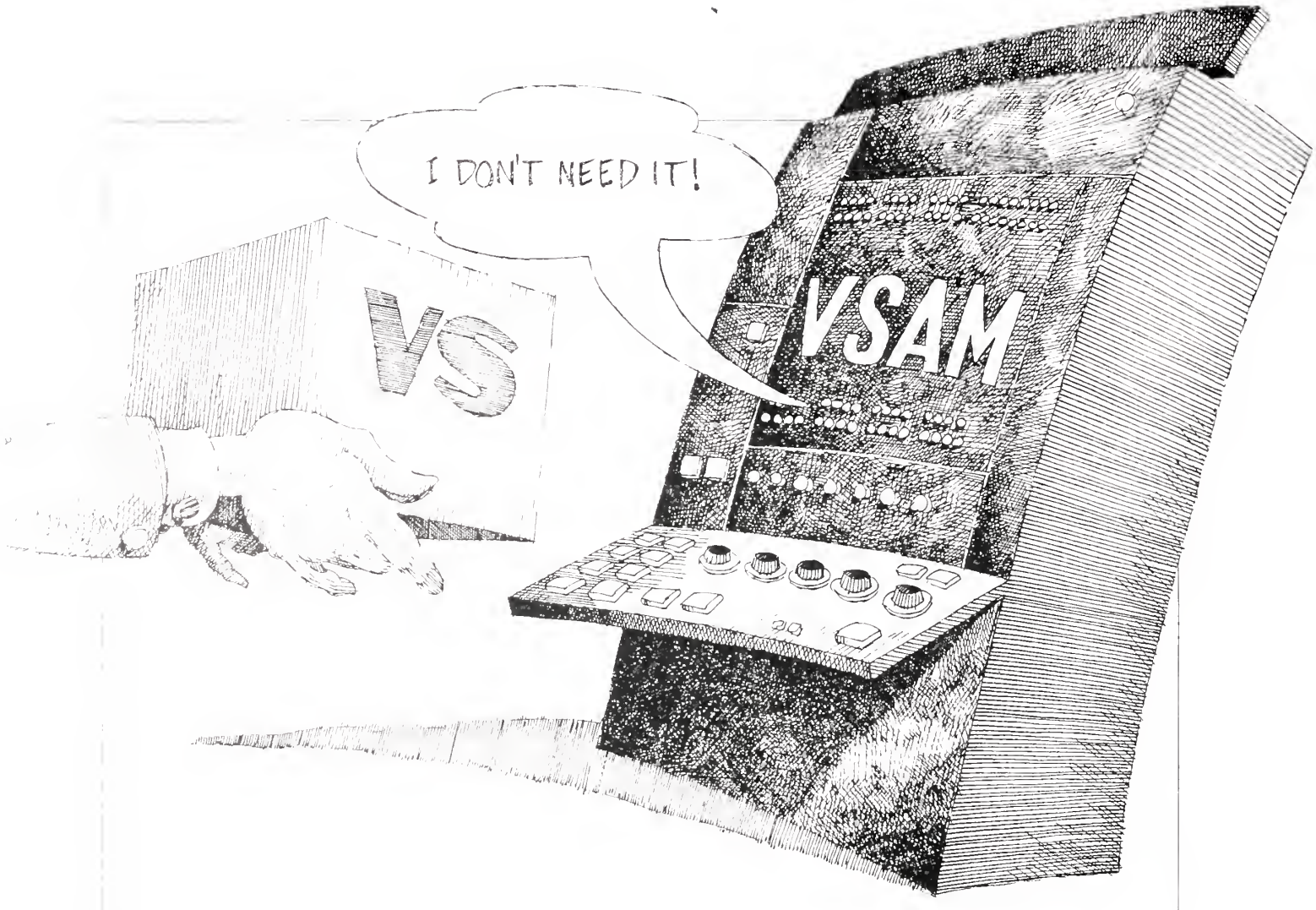

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